

# PATENT ABSTRACTS OF JAPAN

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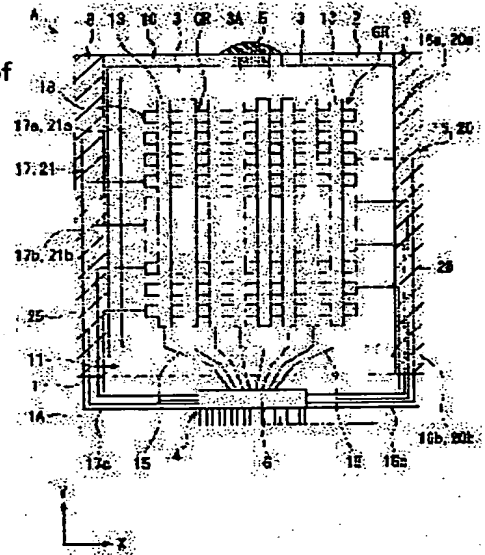
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## (54) OPTOELECTRONIC DEVICE AND ELECTRONIC APPARATUS

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an optoelectronic device capable of making resistance of laying-wirings which are provided in frame edge parts of the circumferences of a picture display area to be low and in which display having the same brightness are made possible at an electrode means being at a position close to a driving circuit means and an electrode means being at a position distant from the driving circuit means.

**SOLUTION:** In this device, laying-wirings 20, 21 for connecting a driving circuit means 6 and electrodes are formed on the substrate of one side corresponding to frame edge areas positioned at both edge parts of electrodes formed along either direction of plural electrodes 13, 18 arranged in a matrix shape and laying-sub-wirings 16, 17 are formed on the frame edge parts of the substrate of a side in which the laying-wirings are not formed so as to be confronted with the laying-wirings and the laying-wirings and the laying-sub-wirings confronting with each other of both substrates are brought into conduction by upper and lower conductive members interposed between the both substrates.



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**CLAIMS**

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[Claim(s)]

[Claim 1] While opposite arrangement of the substrate with which two or more signal-electrode means were formed, and the substrate with which two or more scan electrode means were formed is carried out, two or more signal-electrode means and two or more scan electrode means are arranged in the shape of a plane view matrix and an image display field is divided. The drive circuit means for driving said signal-electrode means and said scan electrode means to said substrate is established. It comes to connect with each signal-electrode means or each scan electrode means through two or more leading-about wiring with which this drive circuit means was formed on said each substrate. Leading-about wiring for connecting said drive circuit means and said electrode means on a substrate corresponding to the frame field located in the edge side of the electrode along an one direction is formed. either among two or more electrodes arranged in the shape of [ said ] a matrix — Take about so that the frame field of a near substrate in which said leading-about wiring is not formed may be countered with said leading-about wiring, and subwiring is formed. The electro-optic device characterized by coming to flow by the vertical flow member to which it took about with leading-about wiring of said both substrates which carries out phase opposite, and subwiring intervened among both substrates.

[Claim 2] The electrode means by the side of infestation of the substrate of said another side of the electrode means by the side of a column is respectively formed in one [ said ] substrate. Said leading-about secondary wiring is formed in the frame field formed in the right-and-left both sides of one [ said ] substrate. While leading-about wiring of the electrode means by the side of infestation is formed in the frame field of the right-and-left both sides of the substrate of said another side and leading-about secondary wiring of one [ said ] substrate and leading-about wiring of the substrate of said another side which counters this are connected by said vertical flow member. The electrode means by the side of the column of one [ said ] substrate is connected to a drive circuit means through connection wiring by the side of the column formed on one [ said ] substrate. The electro-optic device according to claim 1 characterized by coming to connect leading-about secondary wiring of one [ said ] substrate with a drive circuit means through connection wiring by the side of the row formed on one [ said ] substrate.

[Claim 3] The electrode means by the side of a column is respectively formed in the substrate of said another side for the electrode means by the side of infestation of one [ said ] substrate. Leading-about wiring connected to the electrode means by the side of said infestation is formed in the frame field formed in the right-and-left both sides of one [ said ] substrate. Leading-about secondary wiring for electrode means by the side of said infestation is formed in the frame field of the right-and-left both sides of the substrate of said another side. While leading-about wiring of one [ said ] substrate and leading-about secondary wiring of the substrate of said another side which counters this are connected by said vertical flow member. The electrode means by the side of the column of the substrate of said another side is connected to a drive circuit means through connection wiring by the side of the column formed on one [ said ] substrate. The electro-optic device according to claim 1 characterized by coming to connect leading-about wiring of one [ said ] substrate with a drive circuit means through connection wiring by the side of the row formed on one [ said ] substrate.

[Claim 4] The electro-optic device according to claim 1 to 3 characterized by coming to form an equal-width frame field in the right-and-left both sides of said image display field.

[Claim 5] The electro-optic device according to claim 1 to 4 characterized by considering said leading-about secondary wiring as isolated wiring connected with said neither of electrode means on the substrate in which this leading-about secondary wiring was formed.

[Claim 6] The electro-optic device according to claim 1 to 5 characterized by said vertical flow means consisting of what scattered the electric conduction particle to the interior of an insulating resin layer for two or more minutes.

[Claim 7] While considering as the frame field in which a part of field in which the sealing layer by which it was placed between the periphery sections between the substrates of said pair came to enclose liquid crystal between the substrates of a pair, and said sealing layer was prepared took about with said leading-about wiring, and subwiring was prepared The electro-optic device according to claim 1 to 6 characterized by two or more electric conduction particles being distributed inside said sealing layer, taking about by these electric conduction particle, taking about with wiring, and coming to carry out the vertical flow of the subwiring.

[Claim 8] The electro-optic device according to claim 7 characterized by sprinkling the gap agent for controlling the thickness of a liquid crystal layer to said sealing layer.

[Claim 9] The electro-optic device according to claim 1 to 8 characterized by coming it to carry out leading-about wiring width of face far [ among the electrode means connected with said drive circuit means ] in location from said drive circuit means for electrode means thicker than the leading-about wiring width of face for electrode means near said drive circuit means in location in two or more leading-about wiring formed in said frame field.

[Claim 10] The electro-optic device according to claim 1 to 9 with which said signal-electrode means is characterized by coming to provide 2 terminal mold nonlinear device arranged between the pixel polar zone formed for every pixel, and said signal wiring section and said pixel polar zone.

[Claim 11] Electronic equipment characterized by equipping either of said claim 1 to claims 10 with the electro-optic device of a publication as a display means.

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#### **DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to an electro-optic device and electronic equipment, and relates to the technique which made special structure wiring structure of the part especially called the frame field of an image display field periphery.

[0002]

[Description of the Prior Art] In portable electronic devices, such as a notebook computer, pocket mold electronic equipment, and a wrist watch, etc., the liquid crystal display is widely used as a means to display various kinds of information. Drawing 1010 shows in simple the example of 1 structure of the liquid crystal display of the passive matrix mold used widely in this kind of liquid crystal display, the liquid crystal display 100 of this example opens a cel gap with the suitable substrates 101 and 102 of the transparence of a pair, opposite arrangement is carried out, and liquid crystal 105 is enclosed between a substrate 101 and 102 by the sealing agent 103 arranged at the periphery part of the substrates 101 and 102 which counter. Moreover, two or more band-like electrodes (segment electrode) 106 which become an inside by the side of the liquid crystal of said substrate 101 from a transparence electrical conducting material Are formed so that it may extend separately in the lengthwise direction of drawing 10 , and it is formed so that it may extend in the direction ( drawing 10 (a) longitudinal direction) in which said electrode 106 and two or more band-like electrodes (common electrode) 107 which become an inside by the side of the liquid crystal layer of a substrate 102 from a transparence electrical conducting material cross at right angles. Two or more electrodes 106 and two or more electrodes 107 are arranged in the shape of a plane view matrix.

[0003] Next, it was pulled out from two or more previous electrodes 106 of each, lengthen about, and a driver element 109 is connected to the end section side of said substrate 101 through wiring 108. It was pulled out from two or more previous electrodes 107 of each, lengthen about, and a driver element 111 is connected to the left end section side of said substrate 102 through wiring 110. It is constituted so that the condition of the light which passes a liquid crystal layer may be controlled by controlling separately the orientation condition of a liquid crystal molecule that two driver elements 109 and 111 exist in a part for the intersection of two or more electrodes 106 and 107 arranged in the shape of [ previous ] a matrix and image display may be possible. Therefore, let the field where the electrode has been arranged in the shape of a matrix be an image display field. In addition, although the liquid crystal display 100 shown in drawing 10 was equipped with the orientation film, a polarizing plate, etc. other than the structure element explained previously, the back light was prepared when a liquid crystal display 100 was a transparency mold, the color filter was prepared when it was a color display type, and the reflecting layer was prepared when it was a reflective mold, in drawing 10 , explanation of these elements was omitted for simplification of explanation.

[0004] If shown in the liquid crystal display 100 of a configuration of being shown in drawing 10 , since a driver element 111 is formed in the side edge section side of a substrate 102, there is a fault which needs the installation tooth space of a driver element 111 for the side side of an actual image display field. Moreover, with the structure shown in drawing 1010 , the problem which cannot arrange an image display field is in the center section of the liquid crystal display 100. Thus, when an image display field cannot be installed in the center section of the liquid crystal display 100, if it is in an information management system with an especially small cellular phone etc., the width of face of the right-and-left both-sides part of an image display field will differ, and there is a problem which will induce big constraint due to screen arrangement.

[0005] From the above backgrounds, to drawing 11 R> 1, this invention persons did development research of the liquid crystal display in which outline structure is shown, and have proposed it. If shown in the liquid crystal display 120 shown in drawing 11 While it considers as the same breadth where opposite arrangement of the substrates 121 and 123 of the pair which pinches liquid crystal is carried out, and the dip of the substrate 123 of another side is short formed rather than the dip of one substrate 121 The form of two or more electrodes 122 by the side of a column (signal electrode) is carried out to one substrate 121 among matrix-like electrodes. Two or more electrodes 125 by the side of infestation of the substrate 123 of another side (scan electrode) are formed, and the frame fields 126 and 127 of equal width of face are mostly established in the both sides of the field where these electrodes are arranged in the shape of a plane view matrix. And it lengthens about by turns from the edge of two or more electrodes 125 by the side of infestation of the flank side of the substrate 121

corresponding to both the frame fields 126 and 127, wiring 128 is pulled out, and it considers as the structure which it comes to connect with the driver element 130 which these prepared on the edge of one substrate 121. Moreover, it lengthens about from the electrode 122 by the side of two or more columns formed in the substrate 123 side of another side, and after wiring 131 is wired from a substrate 123 side at a substrate 121 side through the vertical flow member of illustration abbreviation arranged at the boundary part of both the substrates 121 and 123 etc., it is connected to the driver element 130. In addition, what is shown with a sign 132 in drawing 11 is the flexible substrate connected to the driver element 130.

[0006]

[Problem(s) to be Solved by the Invention] While the image display field had been arranged in the display center section since the equal-width frame fields 126 and 127 were formed in substrate both sides if shown in the liquid crystal display 120 of the structure shown in drawing 11, it was what has the outstanding description that the driver element which is shown in drawing 10, and which was conventionally required for two with structure is collected by one. In addition, although drawing 11 has indicated widely the frame fields 126 and 127 of the right-and-left both sides of an image display field for simplification of explanation, it is far narrow rather than the frame fields 126 and 127 are shown in drawing 11 in actual equipment, since it is possible to lengthen about and to form wiring thinly, for example, since it can form in about several mm, narrow picture frame-ization can be attained with the structure shown in drawing 11. However, it had the problem which was connected to the electrode 125 in the location which was connected to the electrode 125 of the location near [ if shown in the liquid crystal display 120 shown in drawing 11, since the distance from the electrode 125 of the plurality by the side of infestation to a driver element 130 differs for every electrode ] a driver element 130, and which lengthened about and is distant from wiring 128 and a driver element 130 and from which it will lengthen about and the die length of wiring 128 will differ sharply. Wiring resistance comes to differ for every electrode that it seems that the die length of wiring 128 differs sharply. it these-\*\*\*\*\* -- Since the electric field which the electrode 125 of a location distant from a driver element 130 gives to liquid crystal come to differ from the electric field which the electrode 125 of the location near a driver element 130 gives to liquid crystal delicately when especially a liquid crystal display is the thing of a passive matrix mold Even if it is carrying out drive control of each electrode so that the same electric field can be impressed, there is a problem of having possibility that the display of the same brightness cannot be performed for every electrode. Moreover, since it became the inclination whose driver voltage wave becomes easy to become blunt when resistance of a wiring part impressed driver voltage to a big electrode, there was a possibility that the actual value of the electrical potential difference impressed to liquid crystal might change.

[0007] This invention was made in view of the above-mentioned trouble, can make low resistance-ization of leading-about wiring prepared in the frame part around an image-display field, makes \*\*\*\* of a drive wave as the same as possible in the electrode means of the location near a drive circuit means, and the electrode means of the distant location, and aims at offer of the electro-optic device which could be made to perform the display of the same brightness also in which electrode means.

Furthermore, in the right-and-left both sides around an image display field, even if this invention prepares an equal-width frame field, it aims at offer of the electro-optic device which can acquire the same effectiveness as the above-mentioned thing, and can also attain narrow picture frame-ization. Next, this invention aims at offer of electronic equipment equipped with the above outstanding electro-optic devices.

[0008]

[Means for Solving the Problem] In order that the electro-optic device of this invention may solve said technical problem, opposite arrangement of the substrate with which two or more signal-electrode means were formed, and the substrate with which two or more scan electrode means were formed is carried out. While two or more signal-electrode means and two or more scan electrode means are

arranged in the shape of a plane view matrix and an image display field is divided The drive circuit means for driving said signal-electrode means and said scan electrode means to said substrate is established. It comes to connect with each signal-electrode means or each scan electrode means through two or more leading-about wiring with which this drive circuit means was formed on said each substrate. Leading-about wiring for connecting said drive circuit means and said electrode means on a substrate corresponding to the frame field located in the edge side of the electrode along an one direction is formed. either among two or more electrodes arranged in the shape of [ said ] a matrix -- It is characterized by coming to flow by the vertical flow member to which it took about so that the frame field of a near substrate in which said leading-about wiring is not formed might be countered with said leading-about wiring, and subwiring was formed, it took about with leading-about wiring of said both substrates which carries out phase opposite, and subwiring intervened among both substrates. [0009] Since it is formed so that the substrate in which takes about with leading-about wiring and subwiring carries out phase opposite may be countered, and they are connected by the vertical flow member, it lengthens about, and wiring resistance can be reduced rather than it wires by the wiring independent. Therefore, it is rare to cause \*\*\*\* of a signal wave form, and a display is possible, even if a drive circuit means impresses a signal to which scan electrode means or signal-electrode means of a location of an image display field, without producing the nonuniformity of brightness.

[0010] As for this invention, the electrode means by the side of infestation of the substrate of said another side of the electrode means by the side of a column is respectively formed in one [ said ] substrate. Said leading-about secondary wiring is formed in the frame field formed in the right-and-left both sides of one [ said ] substrate. While leading-about wiring of the electrode means by the side of infestation is formed in the frame field of the right-and-left both sides of the substrate of said another side and leading-about secondary wiring of one [ said ] substrate and leading-about wiring of the substrate of said another side which counters this are connected by said vertical flow member It is characterized by connecting with a drive circuit means through connection wiring by the side of the column by which the electrode means by the side of the column of one [ said ] substrate was formed on one [ said ] substrate, and coming to connect leading-about secondary wiring of one [ said ] substrate with a drive circuit means through connection wiring by the side of the row formed on one [ said ] substrate. Since it is formed so that the substrate which was connected to the electrode means and in which takes about, and takes about with wiring and subwiring carries out phase opposite may be countered, and they are connected by the vertical flow member, it lengthens about, and wiring resistance can be reduced rather than it wires by the wiring independent. Therefore, it is rare to cause \*\*\*\* of a signal wave form, and a display is possible, even if a drive circuit means impresses a signal to the electrode means of which location of an image display field, without producing the nonuniformity of brightness.

[0011] As for this invention, the electrode means by the side of a column is respectively formed in the substrate of said another side for the electrode means by the side of infestation of one [ said ] substrate. Leading-about wiring connected to the electrode means by the side of said infestation is formed in the frame field formed in the right-and-left both sides of one [ said ] substrate. Leading-about secondary wiring for electrode means by the side of said infestation is formed in the frame field of the right-and-left both sides of the substrate of said another side. While leading-about wiring of one [ said ] substrate and leading-about secondary wiring of the substrate of said another side which counters this are connected by said vertical flow member It is characterized by connecting with a drive circuit means through connection wiring by the side of the column by which the electrode means by the side of the column of the substrate of said another side was formed on one [ said ] substrate, and coming to connect leading-about wiring of one [ said ] substrate with a drive circuit means through connection wiring by the side of the row formed on one [ said ] substrate. Since it is formed so that the substrate which was connected to the electrode means and in which takes about, and takes about with wiring and subwiring carries out phase opposite may be countered, and they are connected by the vertical flow

member, it lengthens about, and wiring resistance can be reduced rather than it wires by the wiring independent. Therefore, it is rare to cause \*\*\*\* of a signal wave form, and a display is possible, even if a drive circuit means impresses a signal to the electrode means of which location of an image display field, without producing the nonuniformity of brightness.

[0012] This invention is characterized by coming to form an equal-width frame field in the right-and-left both sides of said image display field. By the equal-width frame field being formed in the right-and-left both sides of an image display field, an image display field can be arranged in the center section of equipment. Moreover, it is rare to cause \*\*\*\* of a signal wave form like the point on it, and the electro-optic device whose display is possible can be offered, without producing the nonuniformity of brightness.

[0013] This invention is characterized by considering said leading-about secondary wiring as isolated wiring connected with said neither of electrode means on the substrate in which this leading-about secondary wiring was formed. Since wiring resistance is reduced by lengthening about, drawing subwiring about and flowing with wiring, the electrode means by the side of the substrate which lengthened about and formed subwiring does not have the need of connecting.

[0014] This invention is characterized by said vertical flow means consisting of what scattered the electric conduction particle to the interior of an insulating resin layer for two or more minutes. Although what specifically scattered the electric conduction particle to the interior of an insulating resin layer for two or more minutes is applicable as a vertical flow member, if it is the thing of this structure, what is generally widely used as vertical flow material for liquid crystal displays etc. can be used. A vertical flow member is put with the substrate of a pair, it pushes mutually, an internal electric conduction particle is lengthened about, and a vertical flow is easily completed by wiring or lengthening about and putting with subwiring.

[0015] While considering as the frame field in which a part of field in which the sealing layer by which it was placed between the periphery sections between the substrates of said pair came to enclose liquid crystal between the substrates of a pair, and said sealing layer was prepared took about this invention with said leading-about wiring, and subwiring was prepared Two or more electric conduction particles are distributed inside said sealing layer, and it takes about by these electric conduction particle, takes about with wiring, and is characterized by coming to carry out the vertical flow of the subwiring. If a sealing layer is arranged also to the frame field in which it lengthens about and wiring is prepared using that by which the electric conduction particle was distributed by the sealing layer, a sealing layer can adopt the configuration which serves as a vertical flow member. This invention is characterized by sprinkling the gap agent for controlling the thickness of a liquid crystal layer to said sealing layer. If the gap agent is distributed by the sealing layer, since substrates constitute a regular cel gap through a gap agent, the thickness of a uniform cel gap, i.e., a uniform liquid crystal layer, is securable. Moreover, even if it lessens the gap agent which will be distributed to an image display field side if the gap agent is distributed by the sealing layer or does not distribute a gap agent to an image display field side, a uniform cel gap, i.e., the thickness of a uniform liquid crystal layer, is securable. Such structure especially is effective in a small, the liquid crystal panel of the type which does not make a viewing area distribute a gap agent, for example, the liquid crystal display of a cellular phone etc., etc., liquid crystal display.

[0016] This invention is characterized by coming it thicker than the leading-about wiring width of face for electrode means near said drive circuit means in location to carry out leading-about wiring width of face far [ among the electrode means connected with said drive circuit means ] in location from said drive circuit means for electrode means in two or more leading-about wiring formed in said frame field. The display of equal brightness can do also to the electrode means of which location [ as opposed to / if it lengthens about and it comes it thick than the leading-about wiring width of face for electrode means near said drive circuit means in location to be carried out the wiring width of face of wiring / an electrode means far in location ] which lengthens about, can make wiring resistance of wiring low, and exists in an image-display field connected to an electrode means are to a location distant from a drive

circuit means.

[0017] It is characterized by this invention coming to provide 2 terminal mold nonlinear device by which said signal-electrode means has been arranged between the pixel polar zone formed for every pixel, and said signal wiring section and said pixel polar zone. Even if a drive circuit means impresses a signal to the electrode means of which location of an image display field, the description whose display is possible can be enjoyed also in the equipment of the structure of coming to provide 2 terminal mold nonlinear device, without producing the nonuniformity of brightness.

[0018] Since it is characterized by the electronic equipment of this invention equipping said either with the electro-optic device of a publication as a display means, it has the description whose display is possible, without producing the nonuniformity of brightness.

[0019]

[Embodiment of the Invention] Hereafter, this invention is not restrained by the gestalt of the following operations although the gestalt of operation of this invention is explained based on a drawing.

The top view where "gestalt of the 1st operation" drawing 1 - drawing 4 applied this invention to the liquid crystal display (electro-optic device) of a passive matrix mold and in which the gestalt of the 1st operation is shown and drawing 1 shows the whole liquid crystal display A structure, and drawing 2 take about the top view of one substrate of said liquid crystal display A, the top view of the substrate of another side of said liquid crystal display A and drawing 4 take about drawing 3, it takes about with wiring, and the cross-section structure of the connection part of subwiring is shown. Moreover, in order to make each class and each part material into the magnitude of extent which can be recognized on a drawing, scales are made to have differed for each class or every each part material in each drawing. Opposite arrangement of one substrate 1 and the substrate 2 of another side is carried out, and, as for the liquid crystal display A of this gestalt, liquid crystal is enclosed among both substrates. The substrate 1 and the sealing layer 3 which was located among two and has been arranged plain-view substantially rectangle-shaped are formed, it is surrounded by substrates 1 and 2 and the sealing layer 3, and liquid crystal is more specifically enclosed with the periphery section side of substrates 1 and 2. moreover, said a part of sealing layer 3 -- it is formed in a side ( drawing 1 upper limit section side) so that inlet 3A for liquid crystal impregnation may arrive at the edge of substrates 1 and 2, and liquid crystal is enclosed by closing this inlet 3A by the sealant 5.

[0020] Breadth (breadth in the plane view condition of carrying out opposite arrangement of both the substrates 1 and 2) in the condition which shows in drawing 1 of one [ said ] substrate 1 and the substrate 2 of another side is made the same. The dip (dip shown in drawing 1 ) of one substrate 1 is formed for a long time a little rather than the substrate 2 of another side, the substrate 2 of another side is overflowed, while was prepared and the drive circuit means (drive circuit element) 6 of 1 chip mold is installed in the installation field 4 of the center of edge side 1A of a substrate 1. In addition, as shown in drawing 1, in the condition of having carried out opposite arrangement of the substrates 1 and 2, inside the sealing layer 3, two or more electrodes (electrode means) 13 mentioned later and two or more electrodes (electrode means) 18 are arranged in the shape of a matrix, and the rectangle-like image display field GR is formed with these electrodes. Next, the left-hand side frame field 8 is formed in the left-hand side part of the image display field GR shown in drawing 1. The right-hand side frame field 9 is formed in the right-hand side part of the image display field GR, and the upper frame field 10 is formed in the upper part of the image display field GR. The lower frame field 11 is formed in the lower part of the image display field GR, among those the frame fields 8 and 9 of the right-and-left both sides of the image display field GR are made into equal width.

[0021] Next, the electrode means formed in substrates 1 and 2, leading-about wiring, leading-about secondary wiring, etc. are explained to a detail. In addition, although the electrode and wiring which are explained below are fundamentally formed from transparence electrical conducting materials, such as ITO (indium stannic acid ghost), of course, leading-about wiring of these and leading-about secondary wiring may be constituted from metal wiring for the reduction in resistance. Although the arrangement



structure of the electrode means currently formed in drawing 2 at one [ said ] substrate 1 is shown, by this gestalt, eight band-like electrodes 13 (electrode means) by the side of a column (Y side) are formed in the predetermined pitch so that the central site of a substrate 1 may be occupied. in addition — although drawing 2 showed only eight electrodes 13 for simplification of explanation, if it is shown in an actual liquid crystal display — screen resolution — in all — dozens of— 1000 — hundreds of electrodes are arranged. Moreover, as shown also in drawing 1 , let the field in which said electrode 13 is installed be a field inside a sealing layer 3.

[0022] Next, the end section side (the drawing 1 side or lower limit section side of drawing 2 R> 2) of each electrode 13 is connected to the drive circuit element 6 through the connection wiring 15 formed on the substrate 1. moreover, on the right-hand side of the formation field of the electrode 13 on the substrate 1 shown in drawing 2 Take about so that it may correspond to the electrode 18 of an every other of two or more electrodes 18 by the side of the infestation formed in the substrate 2 side of another side later mentioned based on drawing 3 separately, and the subwiring 16 is formed. Also on the substrate 1 on the left-hand side of the formation field of an electrode 13, take about so that it may correspond to the remaining electrodes 18 of an every other of the electrodes 18 formed in the substrate 2 side of another side mentioned later similarly, and the subwiring 17 is formed. Each leading-about secondary wiring 16 and 17 is separately connected to the drive circuit element 6 on a substrate 1. In addition, wiring section 16a which each leading-about secondary wiring 16 extends in the same direction (the direction of X) as the electrode 18 later mentioned based on drawing 3 , and is extended in a longitudinal direction in a substrate 1 top, Extension section 16b which is extended to a lengthwise direction (the direction of Y) in a substrate 1 top, and is prolonged in the edge side of a substrate 1, It consists of connection 16c for extending in a longitudinal direction (the direction of X) from the edge of a substrate 1, and connecting with the drive circuit element 6, and the leading-about secondary wiring 17 consists of wiring section 17a, extension section 17b, and connection 17c similarly.

[0023] Although the arrangement structure of the electrode means formed in drawing 3 at the substrate 2 of said another side is shown, by this gestalt, ten band-like electrodes 18 (electrode means) by the side of a row (X side) are formed in the predetermined pitch so that the center-section side of a substrate 2 may be occupied. in addition — although drawing 3 showed only ten electrodes 18 for simplification of explanation, if it is shown in an actual liquid crystal display — screen resolution — in all — dozens of— 1000 — hundreds of electrodes are arranged. Moreover, the field in which said electrode 18 is installed is made into the field inside a sealing layer 3 as shown also in drawing 1 , and it is arranged so that it may become plane view matrix-like, as were shown in drawing 1 and two or more above-mentioned electrodes 13 and two or more electrodes 18 explained substrates 1 and 2 previously in the condition of having carried out opposite arrangement in piles.

[0024] Next, it takes about so that it may connect with the edge of two or more electrodes 18 of the above-mentioned infestation by turns, wiring 20 is formed, it takes about so that it may connect with the edge of the remaining things of two or more electrodes 18 of the above-mentioned infestation of the left end side of the substrate 2 of another side by turns, and wiring 21 is formed in the right end section side of the substrate 2 of said another side. Connection 20a which said leading-about wiring 20 is connected to the edge on the right-hand side of an electrode 18, and is prolonged in the longitudinal direction (the direction of X) of a substrate 2, It consists of extension section 20b prolonged to the edge of a substrate 2 in the lengthwise direction (the direction of Y) of a substrate 2, and the leading-about wiring 21 also consists of connection 21a which is similarly connected to the edge on the left-hand side of an electrode 18, and is prolonged in the longitudinal direction of a substrate 2, and extension section 21b prolonged to the edge of a substrate 2 in the lengthwise direction of a substrate 2. And these leading-about wiring 20 is formed so that it may correspond with the leading-about secondary wiring 16 on the substrate 1 explained previously, and it is formed so that the previous leading-about wiring 21 may correspond with the leading-about secondary wiring 17 on the substrate 1 explained previously. namely, the leading-about secondary wiring 16 of each [ the condition of having carried out opposite

arrangement of the substrates 1 and 2 as shown in drawing 1 R> 1 ] and each leading-about wiring 20 -- plane view -- \*\*\*\*\* -- like -- the leading-about wiring 21 of each [ wiring / 17 / each / leading-about secondary ] -- plane view -- \*\*\*\*\* -- it is arranged like.

[0025] Next, in the condition of having carried out opposite arrangement of said substrates 1 and 2 as shown in drawing 1 , while a part of sealing layer 3 is located in the parts of connection 20a of each leading-about wiring 20, and wiring section 16a of each leading-about secondary wiring 16, a part of sealing layer 3 is located in the parts of connection 21a of each leading-about wiring 21, and wiring section 17a of each leading-about secondary wiring 17. Moreover, it mainly takes about with extension section 17b of the previous leading-about secondary wiring 17 to the frame field 8 on the left-hand side of the image display field GR, and extension section 21b of wiring 21 is arranged, it mainly takes about with extension section 16b of the previous leading-about secondary wiring 16 to the frame field 9 on the right-hand side of the image display field GR, and extension section 20b of wiring 20 is arranged.

[0026] And it is placed between the outside fields (part which gave the slash to each outside field by drawing 1 ) of a sealing layer 3 by the vertical flow member 25 in these substrates 1, and the part corresponding to the frame field 8 between two and the part corresponding to the frame field 9. As for these vertical flow members 25, it comes to scatter the electric conduction particle 27 to the interior of the insulating insulating resin layer 26 for two or more minutes. In this electric conduction particle 27, which things, such as what performed metal coating, may be used for the front face of a metal ball with a particle size of several micrometers, a globular form conductive polymer ball, and a globular form polymer ball. If substrates 1 and 2 are stuck by pressure from the condition made to be placed between both frame fields 8 and 9 when make substrates 1 and 2 specifically counter, making it rival and unifying, a vertical flow will be electrically made because the extension sections 16b and 20b or the extension sections 17b and 21b which were formed in substrates 1 and 2 put the electric conduction particle 27 as shown in drawing 3 . In addition, like these, it exists in the frame fields 8 and 9, lengthens about, and lengthens about with the wiring sections 16a and 17a of the subwiring 16 and 17, and electric connection is made by the vertical flow member 25 also in the extension sections 20a and 21a of wiring 20 and 21. Therefore, when plane view of the substrates 1 and 2 is carried out, it takes about with the leading-about wiring 20 which carries out phase opposite, and the vertical flow of the subwiring 16 is carried out separately electrically, it takes about with the leading-about wiring 21 which carries out phase opposite, and the vertical flow of the subwiring 17 is carried out electrically separately.

[0027] In addition, in the case of an actual liquid crystal display, a polarizing plate, a phase contrast plate, etc. are arranged on the outside of said substrates 1 and 2, but Although a back light is prepared in a substrate rear-face side when a liquid crystal display is a transparency mold, a reflecting layer is prepared when it is a reflective mold, and a color filter is prepared in explanation of this operation gestalt when it is a color display mold while omitting a publication and explanation of these members In the case of the gestalt of this operation, explanation of these components was omitted.

[0028] Like the above, when the drive circuit element 6 supplies a picture signal and a scan signal to each electrodes 13 and 18 to predetermined timing respectively, the orientation condition of the liquid crystal molecule which exists between the intersection parts of these electrodes can be controlled by these electrode 13 -- and driving 18 --, and a display can be controlled by the constituted liquid crystal display A according to them. [ since ... is driven, when it is going to impress an electrical potential difference to each electrode 18 ] and the electrode 18 of infestation of the drive circuit element 6 -- Even if it is going to impress the same electrical potential difference as the electrode 18 in the location near the drive circuit element 6, and the electrode 18 in the location distant from the drive circuit element 6, between the drive circuit element 6 and an electrode 18 Since take about, it takes about with wiring 20, it takes about with the subwiring 16 and the leading-about wiring 21 in which the vertical flow was carried out by the vertical flow member 25 in which the vertical flow was carried out by the vertical flow member 25 which exists in the frame field 8, and which exists in the frame field 9 and the subwiring 17 exists As a result which has carried out [ low \*\*\*\* ]-izing, to any electrode 18 of a location, the

target electrical potential difference can be impressed certainly and can be driven rather than the structure including these which lengthens about and shows the resistance as the whole wiring to drawing 11 . Therefore, also in a part of image display field GR corresponding to the electrode 18 which is separated from the drive circuit element 6, the display of the brightness of homogeneity can be obtained also in a part of image display field GR corresponding to the electrode 18 in the location near the drive circuit element 6. Subsequently, with the equipment of the gestalt of this operation, since the almost equal-width frame fields 8 and 9 are formed in the right-and-left both sides of the image display field GR, the frame viewing area GR can be arranged in the center section of the whole liquid crystal display.

[0029] In addition, in the gestalt of this operation, although it lengthens about, and it lengthens about with wiring 20 and 21 and not being asked especially about each width of face of the subwiring 16 and 17, it is good also as width of face which is good also as equal width of face, and is different in these. You may adopt the structure of lengthening about and forming wiring 20 and 21 most thickly which lengthened about gradually, formed wiring 20 and 21 thickly, and separated most from the drive circuit element 6 as it becomes the electrode 18 linked to the electrode 18 nearest to [ when considering as different width of face ] the drive circuit element 6 which lengthened about, formed wiring 20 and 21 most thinly, and is separated from the drive circuit element 6. Moreover, it lengthens about, and lengthens about with wiring 20 and 21, and subwiring 16 and 17 can also be considered as metal wiring. Since-izing can be carried out [ low \*\*\*\* ] rather than transparence electrical conducting materials, such as ITO, when it considers as metal wiring, thinning of the width of face of wiring itself can be carried out, and further narrow picture frame-ization can be attained. Moreover, although it lengthened about and wiring 20 and 21 was connected to the electrode 18 in every other one with the gestalt of this operation, how to make these connection does not have a limit and you may connect with it two or more [ every ].

[0030] They are the flat-surface schematic drawing showing [ showing the gestalt of the 2nd operation, and / drawing 5's (a's)'s taking about with the flat-surface schematic drawing of the liquid crystal display of this gestalt and drawing 5's (b's)'s taking about with the electrode of one substrate of a liquid crystal display, and ] wiring etc. where "gestalt of the 2nd operation" drawing 5 applied this invention to the liquid crystal display (electro-optic device) of a passive matrix mold, and the flat-surface schematic drawing in which drawing 5's (c's)'s taking about with the electrode of the substrate of another side of a liquid crystal display, and showing wiring etc. Moreover, in order to make each class and each part material into the magnitude of extent which can be recognized on a drawing, scales are made to have differed for each class or every each part material in each drawing. Since the liquid crystal display B of the gestalt of this 2nd operation is an example of the liquid crystal display of the gestalt which made reverse wiring structure of the liquid crystal display A of the gestalt of previous operation of the 1st by the substrate side of another side one substrate side, the same sign is given to the same component and those explanation is simplified. Furthermore, since it is equivalent to the gestalt of the 1st operation about the structure where opposite arrangement of one substrate 31 and the substrate 32 of another side is carried out, liquid crystal is pinched among them in the gestalt of the 2nd operation, and a sealing layer is prepared between substrates Drawing 5 (a) shows only the important section of an electrode and wiring structure, take about with the electrode of one substrate 31 in drawing 5 (b), and only the arrangement structure of wiring is explained. In drawing 5 (c), it takes about with the electrode of the substrate 32 of another side, only the arrangement structure of wiring is explained, and a publication and explanation of the detail structure about parts, such as a sealing layer, are omitted.

[0031] As shown in drawing 5 (b), the electrode 33 of infestation is formed in one substrate 31 in a two or more predetermined pitch. In the condition of having made one substrate 31 and the substrate 32 of another side countering as the electrode 35 of a column is formed in the substrate 32 of another side in a two or more predetermined pitch as shown in drawing 5 (c), and shown in drawing 5 (a) It is constituted so that two or more electrodes 33 and two or more electrodes 35 may be arranged in the

shape of a plane view matrix and may constitute the image display field GR. The leading-about wiring 40 for electrodes is connected to the right end section of the electrode 33 in every other one, respectively, and it is prepared in the frame field 38 on the right-hand side of the image display field GR of one [ said ] substrate 31, and the leading-about wiring 41 is connected to the left end section of the remaining electrodes 33 in every other one, respectively, and it is prepared in the frame field 39 on the left-hand side of the image display field GR. Connection 40a which each previous leading-about wiring 40 is prolonged in a longitudinal direction along with an electrode 33 like the case of leading-about wiring of the gestalt of previous operation of the 1st, and is connected to the edge of an electrode 33, It consists of extension section 40b prolonged in the lengthwise direction of a substrate 32, and connection 40c which is prolonged in the longitudinal direction of a substrate 32 and is connected to the drive circuit element 6, and the leading-about wiring 41 also consists of connection 41a, extension section 41b, and connection 41c.

[0032] Next, the leading-about secondary wiring 43 which consists of connection 40a of the previous leading-about wiring 40, wiring section 43a of an equivalent configuration, previous extension section 40b, and extension section 43b prolonged in the same direction is formed in the frame field 38 on the right-hand side of the electrode 35 of the substrate 32 of another side shown in drawing 5 (b). The leading-about secondary wiring 44 which consists of extension section 44b prolonged in the same direction as connection 41a of the previous leading-about wiring 41, wiring section 44a of an equivalent configuration, and previous extension section 41b is formed also in the frame field 39 on the left-hand side of a substrate 32. therefore, the condition of carrying out opposite arrangement of the substrates 31 and 32 as shown in drawing 5 (a) -- setting -- taking about -- wiring 40 -- taking about -- the subwiring 43 -- a plane view lap and the leading-about wiring 41 -- taking about -- the subwiring 44 -- plane view -- a pile -- it is formed like. And it took about like the case of the gestalt of previous operation of the 1st by the vertical flow member 25 arranged among the frame fields 38 and 39 of the both sides of these substrates 31 and 32, and took about with wiring 40, and the subwiring 43 flowed, it took about with the leading-about wiring 41, and the subwiring 44 has flowed by the vertical flow member 25. Moreover, while connecting with each electrode 35 at the lower limit section side of the electrode 35 of the column of the substrate 32 of another side, two or more connection wiring 45 which extended to the edge side of a substrate 31 is formed, and these connection wiring 45 is connected to the connection wiring 47 connected to the drive circuit element 6 of the 1st previous substrate 31 through the vertical flow member 48.

[0033] Also in the liquid crystal display B which has the substrates 31 and 32 of the structure shown in drawing 5 (a), the operation effectiveness equivalent to the liquid crystal display A of the gestalt of previous operation of the 1st can be acquired. That is, like the above, in the liquid crystal display constituted, when the drive circuit element 6 supplies a picture signal and a scan signal to each electrodes 33 and 35 to predetermined timing respectively, the orientation of the liquid crystal which exists in inter-electrode [ these ] can be controlled by driving these electrodes, and a display can be controlled by it. [ since ... is driven, when it is going to impress an electrical potential difference to each electrode 33 ] and the electrode 33 of infestation of the drive circuit element 6 -- Even if it impresses an electrical potential difference to the electrode 33 in the location near the drive circuit element 6, and the electrode 33 in the location distant from the drive circuit element 6, between the drive circuit element 6 and an electrode 33 It takes about with the leading-about wiring 40 in which the vertical flow was carried out by the vertical flow member 25 which exists in the frame field 38. The subwiring 43, Or since it takes about with the leading-about wiring 41 in which the vertical flow was carried out by the vertical flow member 25 which exists in the frame field 39 and the subwiring 44 exists As a result which has carried out [ low \*\*\*\* ]-izing, to any electrode 33 of a location, the target electrical potential difference can be impressed certainly and can be driven rather than the structure which shows these wiring resistance in drawing 11 . therefore, a part of image display field GR in which the electrode 33 which is separated from the drive circuit element 6 is located -- the brightness of homogeneity can be

obtained to a side. Subsequently, since the almost equal-width frame fields 38 and 39 are formed in the right-and-left both sides of an image display field, about the point that the frame viewing area GR can be arranged in the center section of the whole liquid crystal display, the same effectiveness as the gestalt of previous operation of the 1st can be acquired.

[0034] "Gestalt of the 3rd operation" drawing 6 is the top view which applied this invention to the liquid crystal display (electro-optic device) of a passive matrix mold and in which showing the gestalt of the 3rd operation. Moreover, in order to make each class and each part material into the magnitude of extent which can be recognized on a drawing, scales are made to have differed for each class or every each part material in drawing 6. Although the liquid crystal display C of the gestalt of this 3rd operation is the wiring structure and abbreviation identities of a liquid crystal display A of previous operation of the 1st, it is one gestalt of the structure which extended the formation location of a sealing layer widely, prepared it to the frame field, and gave the vertical flow function to the sealing layer. [ of a gestalt ] In addition, in the gestalt of the 3rd operation, opposite arrangement of one substrate 1 and the substrate 2 of another side is carried out, liquid crystal is pinched among them, and since it is equivalent to the gestalt of the 1st operation about the structure where a sealing layer is prepared between substrates, explanation of those parts is omitted.

[0035] In the gestalt of this 3rd operation, it considers as the structure in which it came to distribute an electric conduction particle inside a sealing layer 53, and the sealing layer 53 served as the vertical flow member. That is, extended formation of the sealing layer 53 is carried out so that it may have the extension sections 53A and 53B which extend to a substrate 1 and the frame fields 8 and 9 of right and left of two. Since it is equivalent to the liquid crystal display A of the gestalt of previous operation of the 1st about the structure of other parts, the same sign is given to the same part and explanation of these same parts is omitted.

[0036] Also in the liquid crystal display C which has the substrates 1 and 2 and sealing layer 53 of the structure shown in drawing 6, the operation effectiveness equivalent to the liquid crystal display A of the gestalt of previous operation of the 1st can be acquired. That is, like the above, in the liquid crystal display C constituted, when the drive circuit element 6 supplies a picture signal and a scan signal to each electrodes 13 and 18 to predetermined timing respectively, the orientation of the liquid crystal which exists in inter-electrode [ these ] can be controlled by driving these electrodes, and a display can be controlled by it. [ since ... is driven, when it is going to impress an electrical potential difference to each electrode 18 ] and the electrode 18 of infestation of the drive circuit element 6 -- Even if it impresses the same electrical potential difference as the electrode 18 in the location near the drive circuit element 6, and the electrode 18 in the location distant from the drive circuit element 6, between the drive circuit element 6 and an electrode 18 It takes about with the leading-about wiring 20 in which the vertical flow was carried out by sealing layer 53A which exists in the frame field 8. The subwiring 16, Or since it takes about with the leading-about wiring 21 in which the vertical flow was carried out by sealing layer 53B which exists in the frame field 9 and the subwiring 17 exists As a result which has carried out [ low \*\*\*\* ]-izing, to any electrode 18 of a location, the target electrical potential difference can be impressed certainly and can be driven rather than the structure which shows these wiring resistance in drawing 11. Therefore, also in a part of image display field GR in the electrode 18 of a location which is separated from the drive circuit element 6, the display of the same brightness can be obtained also in a part of image display field GR corresponding to the electrode 18 near the drive circuit element 6. Subsequently, since the almost equal-width frame fields 8 and 9 are formed in the right-and-left both sides of an image display field, the image display field GR can be arranged in the center section of the whole liquid crystal display. In this case, since it takes about with the leading-about wiring 20 and 21, the vertical flow of the subwiring 16 and 17 is formed and simplification of a production process can be achieved while forming the sealing layer 53 of drawing 6, it is effective in lowering the manufacturing cost of the whole equipment. Moreover, although a regular cel gap is enacted and manufactured, scattering balls, such as a silica (SiO<sub>2</sub>) called a gap agent, and putting a pressure on substrates 1 and 2

in order to control the thickness of a liquid crystal layer to homogeneity, on balls, such as this silica, light is uncontrollable by the liquid crystal display. For this reason, when it is going to obtain a uniform gap (thickness of a liquid crystal layer), it is necessary to scatter many gap agents but, and display grace is dropped, so that it scatters mostly. The gap agent of the image display field GR can be reduced by mixing this gap agent with the sealing layer 53 with the electric conduction particle 27. By this, the optical regulatory region of the image display field GR becomes large, and can give a high-definition indication. In the liquid crystal display applied to a cellular phone etc., the image display field GR is small and the thickness precision of liquid crystal layer sufficient by the gap agent of only a sealing layer can be secured, without winding a gap agent around this field. In this case, the production process which sprinkles a gap agent is also skipped and it can be further made low cost.

[0037] drawing 7 shows the gestalt of operation of the 4th of the liquid crystal display (electro-optic device) concerning this invention, and shows the structure which did not prepare leading-about wiring in the right-and-left both sides of the image display field GR equally, but established only left-hand side a drawing -- only in the 1 side in this gestalt. The frame field 8 where the liquid crystal display (electro-optic device) D of the gestalt of this 4th operation was formed in the right-hand side of a sealing layer 3 with the gestalt of previous operation of the 1st is omitted, and is formed instead more broadly than the gestalt of previous operation of the 1st of the frame field 58 on the left-hand side of a sealing layer 3. And it lengthens about, and wiring 21 is formed in the form which should be connected to the electrode 18 of infestation and which is separately connected to the all electrodes 18 instead of an electrode 18 in every other one, is similarly drawn about, and also about the subwiring 17, it lengthens about and it is formed in all the forms corresponding to wiring 21. Instead, it lengthens about in the frame field on the right-hand side of the image display field GR, and lengthens about with wiring, and subwiring is not formed. About other structures, it is equivalent to the structure of the gestalt of previous operation of the 1st.

[0038] In the liquid crystal display D which lengthens about with the frame field 58 of the structure shown in drawing 7, lengthens about with wiring 17, and has the subwiring 21, although the image display field GR cannot be arranged in an equipment center section, except for it, the operation effectiveness equivalent to the liquid crystal display A of the gestalt of previous operation of the 1st can be acquired. [ since ... is driven, when it is going to impress an electrical potential difference to each electrode 18 ] namely, the electrode 18 of infestation of the drive circuit element 6 -- Even if it impresses an electrical potential difference to the electrode 18 in the location near the drive circuit element 6, and the electrode 18 in the location distant from the drive circuit element 6, between the drive circuit element 6 and an electrode 18 Since it takes about with the leading-about wiring 21 in which the vertical flow was carried out by the vertical flow member 25 which exists in the frame field 58 and the subwiring 17 exists As a result which has carried out [ low \*\*\*\* ]-izing, to any electrode 18 of a location, the target electrical potential difference can be impressed certainly and can be driven rather than the structure which shows wiring resistance in drawing 11. Therefore, also in the image display field GR distant from the drive circuit element 6, the brightness of homogeneity can be obtained also in the image display field GR near the drive circuit element 6.

[0039] By the way, although the example which applied this invention to the liquid crystal display of a passive matrix mold in the gestalt of old operation was explained, of course, this invention may be applied to the liquid crystal display (electro-optic device) of the active-matrix mold which uses the linearity component of 2 terminal molds as a switching device. Drawing 8 is what shows the important section of the wiring circuit of the image display field of the liquid crystal display of the active-matrix mold which uses the linearity component of this kind of 2 terminal molds as a switching device. In this gestalt, opposite arrangement of the substrate 62 by the side of a component is carried out through a regular cel gap to the substrate 61 by the side of opposite. Both the substrates 61 and the liquid crystal of illustration abbreviation among 62 are enclosed, and it considers as the configuration in which two or more band-like scan electrodes (electrode means) 64 were formed in the predetermined pitch at the

substrate 61 by the side of opposite.

[0040] Moreover, an insulator layer 71, two or more signal lines 72 formed in the predetermined pitch, and two or more thin-film diode 73 grades are formed in the substrate 62 by the side of a component. Among these, said signal line 72 is arranged so that it may intersect perpendicularly with the previous scan electrode 64 in a predetermined pitch. Two or more pixel electrodes (electrode means) 74 are arranged between the adjoining scan electrodes 64, and let the field two or more previous scan electrodes 64 and two or more signal lines 72 carry out [ the field ] a plane view crossover be an image display field. Furthermore, the previous thin-film diode 73 is equipped with component section 74a of the shape of a piece installed in the pixel electrode 74 side from the scanning line 72, and the insulator layer is formed on component section 74a. And so that the component section 74a concerned may be covered, and as it laps with the pixel electrode 74 in part, the electric conduction film 75 is formed. In addition, although a color filter, the Black matrix, etc. are formed in the substrate 61 side by the side of opposite when a liquid crystal display is a mold corresponding to color display, these parts are omitted in drawing 8.

[0041] since two or more formation of the scan electrode (electrode means) 64 is carried out in a predetermined pitch also in the liquid crystal display constituted as mentioned above and each scan electrode 64 is connected to the drive circuit element prepared on a substrate, it connects with the edge of the scan electrode 64 -- it lengthens about and this invention structure can be applied like the case of the gestalt of previous operation of the 1st to wiring. Namely, two or more electrodes 18 shown in drawing 1 are judged the scan electrode 64 with the gestalt of this operation. If it connects by the vertical flow member in which wiring is prepared and it lengthens about to the frame field of a substrate 62, and subwiring is prepared, and it lengthens about, and lengthens [ it lengthens about to the frame field of a substrate 61, and ] about with wiring, and subwiring is prepared between the frame fields of both the substrates 61 and 62 It can lengthen about, low resistance-ization of wiring can be made, and the same effective voltage as the electrode in the location distant from the drive circuit element like the case where it is the 1st previous operation gestalt, and the electrode in the location near a drive circuit element can be impressed.

[0042] (Operation gestalt of electronic equipment) next, aforementioned the 1- the example of electronic equipment equipped with either of the liquid crystal displays (electro-optic device) of the 5th operation gestalt is explained. Drawing 9 R> 9 (a) is the perspective view having shown an example of a cellular phone. In drawing 9 R> 9 (a), a sign 500 shows the body of a cellular phone, and the sign 501 shows the liquid crystal display section using either of the aforementioned liquid crystal displays. Drawing 9 (b) is the perspective view having shown an example of pocket mold information processors, such as a word processor and a personal computer. In drawing 9 (b), the liquid crystal display section for which the sign 600 used the information processor for and the sign 601 used either of the liquid crystal displays of the above [ the input sections, such as a keyboard, and a sign 603 / the body of an information processor and a sign 602 ] is shown. Drawing 9 (c) is the perspective view having shown an example of wrist watch mold electronic equipment. In drawing 9 (c), a sign 700 shows the body of a clock and the sign 701 shows the liquid crystal display section using either of the aforementioned liquid crystal displays. Drawing 9 (a) Since each electronic equipment shown in - (c) is equipped with the liquid crystal display section which used either of the aforementioned liquid crystal displays, it has the uniform display gestalt of brightness, and a frame field is equal to right and left of an image display field, is narrow, and, moreover, becomes the high thing of display quality.

[0043]

[Effect of the Invention] Since it is formed according to this invention so that the substrate in which takes about with leading-about wiring to the frame field of the outside of an image display field, and subwiring carries out phase opposite may be countered as explained above, and they are connected by the vertical flow member, it lengthens about, and wiring resistance can be reduced rather than it wires by the wiring independent. Therefore, it is rare to cause \*\*\*\* of a signal wave form by this invention

structure, even if a drive circuit means impresses a signal to which scan electrode means or signal-electrode means of a location of an image display field, and it has the description whose display is possible, without producing the nonuniformity of brightness.

[0044] According to this invention, an image display field can be arranged in the center section of equipment by the equal-width frame field being formed in the right-and-left both sides of said image display field. Moreover, it is rare to cause \*\*\*\* of a signal wave form like the point on it, and the electro-optic device whose display is possible can be offered, without producing the nonuniformity of brightness.

[0045] According to this invention, what specifically scattered the electric conduction particle to the interior of an insulating resin layer for two or more minutes is applicable as a vertical flow member, but if it is the thing of this structure, what is generally widely used as vertical flow material for liquid crystal displays etc. can be used. A vertical flow member is put with the substrate of a pair, it pushes mutually, an internal electric conduction particle is lengthened about, and a vertical flow is easily completed by wiring or lengthening about and putting with subwiring.

[0046] While considering as the frame field in which a part of field in which the sealing layer was prepared is taken about in this invention, it takes about with wiring, and subwiring is prepared, two or more electric conduction particles can be distributed inside said sealing layer, and it can take about by these electric conduction particle, and can take about with wiring, the vertical flow of the subwiring can be carried out, and the configuration as which a vertical flow member is served by the sealing layer can be adopted.

[0047] If the width of face of leading-about wiring far in location from a drive circuit means for electrode means makes thick than the width of face of leading-about wiring for electrode means near a drive circuit means in location, in this invention, the display of equal brightness can perform to a drive circuit means also to the electrode means of which location which lengthens about, can make wiring resistance of wiring low, and exists in an image-display field to an electrode means far in location.

[0048] Even if said signal-electrode means can apply this invention also to the configuration which comes to provide 2 terminal mold nonlinear device arranged between the pixel polar zone formed for every pixel, and said signal wiring section and said pixel polar zone and a drive circuit means impresses a signal to the electrode means of which location of an image display field, the equipment whose display is possible can be offered without producing the nonuniformity of brightness.

[0049] Since it is characterized by the electronic equipment of this invention equipping said either with the electro-optic device of a publication as a display means, it has the description which can perform the display without the nonuniformity of brightness.

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[Translation done.]

#### **\* NOTICES \***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.

2. \*\*\*\* shows the word which can not be translated.

3. In the drawings, any words are not translated.

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#### **DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the top view concerning this invention showing the outline structure of the liquid crystal display of the gestalt of the 1st operation.

[Drawing 2] Drawing 2 is the top view showing one substrate of this liquid crystal display.

[Drawing 3] Drawing 3 is the perspective drawing showing the substrate of another side of this liquid crystal display.

[Drawing 4] Drawing 4 takes about with leading-about wiring of this liquid crystal display, and is the sectional view of the connection part of subwiring.

[Drawing 5] Drawing 5 is a thing for [ concerning this invention ] explaining the liquid crystal display of the gestalt of the 2nd operation, and they are the flat-surface schematic drawing in which drawing 5's (a's)'s taking about with the outline top view of a liquid crystal display, and drawing 5's (b's)'s taking about with the electrode of one substrate, and showing wiring, and the perspective drawing in which drawing 5's (c's)'s taking about with the electrode of the substrate of another side, and showing wiring.

[Drawing 6] Drawing 6 is the top view concerning this invention showing the outline structure of the liquid crystal display of the gestalt of the 3rd operation.

[Drawing 7] Drawing 7 is the top view concerning this invention showing the outline structure of the liquid crystal display of the gestalt of the 4th operation.

[Drawing 8] Drawing 8 is the fragmentary sectional view concerning this invention showing the outline structure of the image display field of the substrate of the liquid crystal display of the gestalt of the 5th operation.

[Drawing 9] Drawing 9 shows the example of application of electronic equipment equipped with the electro-optic device concerning this invention, and drawing 9 (a) is [ the perspective view of a personal digital assistant and drawing 9 (c) of the perspective view of a cellular phone and drawing 9 (b) ] the perspective views of wrist watch mold electronic equipment.

[Drawing 10] Drawing 10 shows an example of the conventional liquid crystal display, and the top view and drawing 10 (b) which show the arrangement structure of an electrode where drawing 10 (a) has been arranged in the shape of a matrix are a sectional view.

[Drawing 11] Drawing 11 is the top view showing an example of the liquid crystal display which this invention persons have proposed.

[Description of Notations]

GR Image display field

1 Two Substrate

3 Sealing Layer

6 Drive Circuit Element (Drive Circuit Means)

8 Nine Frame field

13 18 Electrode (electrode means)

16 17 It lengthens about and is subwiring.

20 21 It lengthens about and wires.

25 Vertical Flow Member

26 Insulating Resin Layer

27 Electric Conduction Particle

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[Translation done.]

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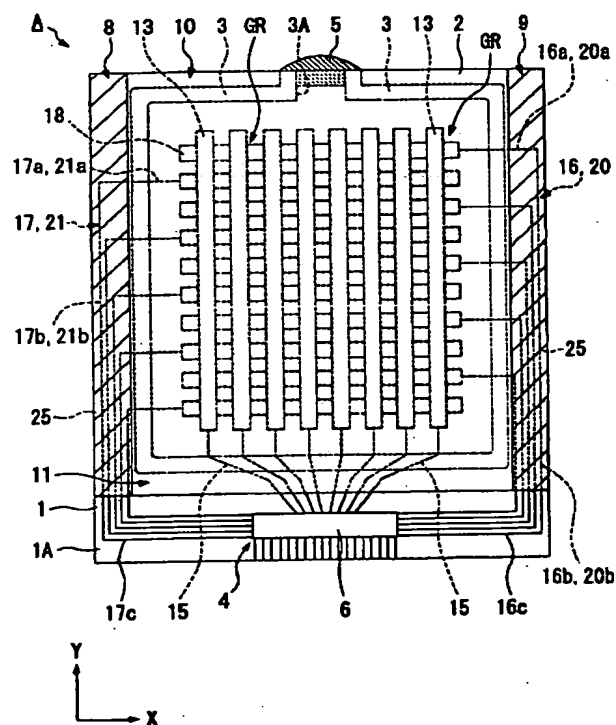
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(54) 【発明の名称】 電気光学装置と電子機器

(57) 【要約】

【課題】 本発明は、画像表示領域周辺の額縁部分に設ける引き回し配線の低抵抗化をなすことができ、駆動回路手段に近い位置の電極手段と離れた位置の電極手段において同じ明るさの表示ができるようにした電気光学装置の提供を目的とする。

【解決手段】 本発明は、マトリクス状に配置された複数の電極13、18のうち、どちらか一方に沿う電極の両端部側に位置する額縁領域に対応する一方の基板上に駆動回路手段6と電極とを接続するための引き回し配線20、21が形成され、引き回し配線が形成されていない側の基板の額縁領域に引き回し配線と対向するように引き回し副配線16、17が形成され、両基板の相対向する引き回し配線と引き回し副配線とが、両基板間に介在された上下導通部材によって導通されてなる。



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## 【特許請求の範囲】

【請求項1】 複数の信号電極手段が形成された基板と複数の走査電極手段が形成された基板とが対向配置され、複数の信号電極手段と複数の走査電極手段が平面視マトリクス状に配置されて画像表示領域が区画されるとともに、前記基板に前記信号電極手段と前記走査電極手段とを駆動するための駆動回路手段が設けられ、該駆動回路手段が前記各基板上に形成された複数の引き回し配線を介して個々の信号電極手段あるいは個々の走査電極手段に接続されてなり、

前記マトリクス状に配置された複数の電極のうち、どちらか一方に沿う電極の端部側に位置する額縁領域に対応する一方の基板上に前記駆動回路手段と前記電極手段とを接続するための引き回し配線が形成され、前記引き回し配線が形成されていない側の基板の額縁領域に前記引き回し配線と対向するように引き回し副配線が形成され、前記両基板の相対向する引き回し配線と引き回し副配線が、両基板間に介在された上下導通部材によって導通されてなることを特徴とする電気光学装置。

【請求項2】 前記一方の基板に縦列側の電極手段が、前記他方の基板に横行側の電極手段が各々形成され、前記一方の基板の左右両側に形成された額縁領域に前記引き回し副配線が形成され、前記他方の基板の左右両側の額縁領域に横行側の電極手段の引き回し配線が形成され、前記一方の基板の引き回し副配線とこれに対向する前記他方の基板の引き回し配線とが前記上下導通部材により接続されるとともに、前記一方の基板の縦列側の電極手段が前記一方の基板上に形成された縦列側の接続配線を介して駆動回路手段に接続され、前記一方の基板の引き回し副配線が前記一方の基板上に形成された横列側の接続配線を介して駆動回路手段に接続されてなることを特徴とする請求項1に記載の電気光学装置。

【請求項3】 前記一方の基板に横行側の電極手段が、前記他方の基板に縦列側の電極手段が各々形成され、前記一方の基板の左右両側に形成された額縁領域に前記横行側の電極手段に接続された引き回し配線が形成され、前記他方の基板の左右両側の額縁領域に前記横行側の電極手段用引き回し副配線が形成され、前記一方の基板の引き回し配線とこれに対向する前記他方の基板の引き回し副配線とが前記上下導通部材により接続されるとともに、前記他方の基板の縦列側の電極手段が前記一方の基板上に形成された縦列側の接続配線を介して駆動回路手段に接続され、前記一方の基板の引き回し配線が前記一方の基板上に形成された横列側の接続配線を介して駆動回路手段に接続されてなることを特徴とする請求項1に記載の電気光学装置。

【請求項4】 前記画像表示領域の左右両側に等幅の額縁領域が形成されてなることを特徴とする請求項1～3のいずれかに記載の電気光学装置。

【請求項5】 前記引き回し副配線が、該引き回し副配

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線を形成した基板上においては前記いずれの電極手段とも接続されていない孤立配線とされたものであることを特徴とする請求項1～4のいずれかに記載の電気光学装置。

【請求項6】 前記上下導通手段が、絶縁樹脂層の内部に導電粒子を複数分散させたものからなることを特徴とする請求項1～5のいずれかに記載の電気光学装置。

【請求項7】 前記一对の基板間の周縁部に介在されたシール層により一对の基板間に液晶が封入されてなり、前記シール層を設けた領域の一部が前記引き回し配線と引き回し副配線が設けられた額縁領域とされるとともに、前記シール層の内部に複数の導電粒子が分散されてこれら導電粒子により引き回し配線と引き回し副配線とが上下導通されてなることを特徴とする請求項1～6のいずれかに記載の電気光学装置。

【請求項8】 前記シール層に、液晶層の厚みを制御するためのギャップ剤が散布されていることを特徴とする請求項7記載の電気光学装置。

【請求項9】 前記額縁領域に形成された複数の引き回し配線において、前記駆動回路手段と接続される電極手段のうち、前記駆動回路手段に位置的に遠い電極手段用の引き回し配線幅が前記駆動回路手段に位置的に近い電極手段用の引き回し配線幅よりも太くされてなることを特徴とする請求項1～8のいずれかに記載の電気光学装置。

【請求項10】 前記信号電極手段が、各画素毎に形成された画素電極部と、前記信号配線部と前記画素電極部との間に配置された2端子型非線形素子を具備してなることを特徴とする請求項1～9のいずれかに記載の電気光学装置。

【請求項11】 前記請求項1から請求項10のいずれかに記載の電気光学装置を表示手段として備えたことを特徴とする電子機器。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は電気光学装置と電子機器に係り、特に、画像表示領域周辺部の額縁領域と称される部分の配線構造を特別な構造とした技術に関する。

【0002】

【従来の技術】ノートパソコン、携帯型電子機器、腕時計等の携帯用電子機器などにおいて、各種の情報を表示する手段として液晶表示装置が広く使用されている。図10はこの種の液晶表示装置において、広く用いられているパッシブマトリクス型の液晶表示装置の一構造例を簡略的に示すもので、この例の液晶表示装置100は、一对の透明の基板101、102が適切なセルギャップをあけて対向配置され、対向する基板101、102の周縁部分に配置された封止材103により基板101、102間に液晶105が封入されている。また、前記基

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板101の液晶側の内面に透明導電材料からなる帯状の複数の電極(セグメント電極)106が、個々に図10の縦方向に延出するように形成され、基板102の液晶層側の内面に透明導電材料からなる帯状の複数の電極(コモン電極)107が前記電極106と直交する方向(図10(a)では横方向)に延出するように形成され、複数の電極106と複数の電極107とが平面視マトリクス状に配置されている。

【0003】次に、前記基板101の一端部側に先の複数の各電極106から引き出された引き廻し配線108を介して駆動素子109が接続され、前記基板102の左端部側に先の複数の各電極107から引き出された引き廻し配線110を介して駆動素子111が接続され、2つの駆動素子109、111が先のマトリクス状に配置された複数の電極106、107の交差部分に存在する液晶分子の配向状態を個々に制御することで液晶層を通過する光の状態を制御して画像表示ができるように構成されている。従って、マトリクス状に電極が配置された領域が画像表示領域とされている。なお、図10に示す液晶表示装置100には先に説明した構造要素の他に配向膜や偏光板等が備えられ、液晶表示装置100が透過型の場合はバックライトが設けられ、カラー表示タイプの場合はカラーフィルタが設けられ、反射型の場合は反射層が設けられるが、図10では説明の簡略化のためにこれらの要素の説明は省略した。

【0004】図10に示す構成の液晶表示装置100にあっては、基板102の側端部側に駆動素子111が設けられるので、実際の画像表示領域の横側に駆動素子111の設置スペースを必要とする欠点がある。また、図10に示す構造では液晶表示装置100の中央部に画像表示領域を配置できない問題がある。このように液晶表示装置100の中央部に画像表示領域を設置できない場合、特に携帯電話等の小型の情報処理機器にあっては画像表示領域の左右両側部分の幅が異なることになり、画面配置の関係で大きな制約を生むこととなる問題がある。

【0005】以上のような背景から本発明者らは、図11に概略構造を示す液晶表示装置を開発研究し提案している。図11に示す液晶表示装置120にあっては、液晶を挟持する一対の基板121、123が対向配置された状態で同じ横幅とされ、一方の基板121の縦幅よりも他方の基板123の縦幅が短く形成されるとともに、マトリクス状の電極のうち、一方の基板121に縦列側の複数の電極(信号電極)122が形成され、他方の基板123に横行側の複数の電極(走査電極)125が形成され、これらの電極が平面視マトリクス状に配置されている領域の両側にほぼ均等幅の額縁領域126、127が設けられている。そして、両額縁領域126、127に対応する基板121の側部側に横行側の複数の電極125の端部から交互に引き廻し配線128が引き出さ

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れ、これらが一方の基板121の端部上に設けた駆動素子130に接続されてなる構造とされている。また、他方の基板123側に形成された複数の縦列側の電極122からの引き廻し配線131は両基板121、123の境界部分に配置される図示略の上下導通部材等を介して基板123側から基板121側に配線された後、駆動素子130に接続されている。なお、図11において符号132で示すものは、駆動素子130に接続されたフレキシブル基板である。

【0006】

【発明が解決しようとする課題】図11に示す構造の液晶表示装置120にあっては、基板両側に等幅の額縁領域126、127が形成されているので、画像表示領域が表示装置中央部に配置されているとともに、図10に示す従来構造では2つ必要であった駆動素子が1つに集約されているという優れた特徴を有するものであった。なお、図11では説明の簡略化のために画像表示領域の左右両側の額縁領域126、127を広く記載しているが、引き廻し配線は細く形成することが可能なので、実際の装置において額縁領域126、127は図11に示すよりも遥かに狭く、例えば数mm程度に形成できるので図11に示す構造では狭額縁化を図ることができる。ところが、図11に示す液晶表示装置120にあっては、横行側の複数の電極125から駆動素子130までの距離が電極毎に異なるために、駆動素子130に近い位置の電極125に接続された引き廻し配線128と、駆動素子130から離れた位置にある電極125に接続された引き廻し配線128の長さが大幅に異なることとなる問題を有していた。これら引き廻し配線128の長さが大幅に異なるようであると、電極毎に配線抵抗が異なるようになり、特に液晶表示装置がパッシブマトリクス型のものである場合、駆動素子130から遠い位置の電極125が液晶に与える電界と、駆動素子130に近い位置の電極125が液晶に与える電界が微妙に異なるようになるので、同じ電界を印加できるように各電極を駆動制御していても、電極毎に同じ明るさの表示ができない可能性を有するという問題がある。また、配線部分の抵抗が大きな電極に対して駆動電圧を印加する場合、駆動電圧波形が鈍り易くなる傾向になるので、液晶に印加する電圧の実効値が変化するおそれがあった。

【0007】本発明は上述の問題点に鑑みてなされたもので、画像表示領域周辺の額縁部分に設ける引き廻し配線の低抵抗化をなすことができ、駆動回路手段に近い位置の電極手段と離れた位置の電極手段において駆動波形の鈍りを出来る限り同じとして、どちらの電極手段においても同じ明るさの表示ができるようにした電気光学装置の提供を目的とする。更に本発明は、画像表示領域周辺の左右両側において、等幅の額縁領域を設けても、前述のものと同じ効果を得ることができ、また、狭額縁化も図ることができる電気光学装置の提供を目的とする。

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次に本発明は、以上のような優れた電気光学装置を備えた電子機器の提供を目的とする。

【0008】

【課題を解決するための手段】本発明の電気光学装置は前記課題を解決するために、複数の信号電極手段が形成された基板と複数の走査電極手段が形成された基板とが対向配置され、複数の信号電極手段と複数の走査電極手段が平面視マトリクス状に配置されて画像表示領域が区画されるとともに、前記基板に前記信号電極手段と前記走査電極手段とを駆動するための駆動回路手段が設けられ、該駆動回路手段が前記各基板上に形成された複数の引き回し配線を介して個々の信号電極手段あるいは個々の走査電極手段に接続されてなり、前記マトリクス状に配置された複数の電極のうち、どちらか一方に沿う電極の端部側に位置する額縁領域に対応する一方の基板上に前記駆動回路手段と前記電極手段とを接続するための引き回し配線が形成され、前記引き回し配線が形成されていない側の基板の額縁領域に前記引き回し配線と対向するように引き回し副配線が形成され、前記両基板の相対向する引き回し配線と引き回し副配線が、両基板間に介在された上下導通部材によって導通されてなることを特徴とする。

【0009】引き回し配線と引き回し副配線が、相対向する基板に対向するように形成されていて、それらが上下導通部材で接続されているので、引き廻し配線単独で配線するよりも配線抵抗を低減できる。よって、駆動回路手段が画像表示領域のいずれの位置の走査電極手段あるいは信号電極手段に対して信号を印加しても、信号波形の鈍りを引き起こすことが少なく、明るさのムラを生じさせることなく表示ができる。

【0010】本発明は、前記一方の基板に縦列側の電極手段が、前記他方の基板に横行側の電極手段が各々形成され、前記一方の基板の左右両側に形成された額縁領域に前記引き回し副配線が形成され、前記他方の基板の左右両側の額縁領域に横行側の電極手段の引き回し配線が形成され、前記一方の基板の引き回し副配線とこれに対向する前記他方の基板の引き回し配線とが前記上下導通部材により接続されるとともに、前記一方の基板の縦列側の電極手段が前記一方の基板上に形成された縦列側の接続配線を介して駆動回路手段に接続され、前記一方の基板の引き回し副配線が前記一方の基板上に形成された横列側の接続配線を介して駆動回路手段に接続されてなることを特徴とする。電極手段に接続された引き回し配線と引き回し副配線が、相対向する基板に対向するように形成されていて、それらが上下導通部材で接続されているので、引き廻し配線単独で配線するよりも配線抵抗を低減できる。よって、駆動回路手段が画像表示領域のいずれの位置の電極手段に対して信号を印加しても、信号波形の鈍りを引き起こすことが少なく、明るさのムラを生じさせることなく表示ができる。

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【0011】本発明は、前記一方の基板に横行側の電極手段が、前記他方の基板に縦列側の電極手段が各々形成され、前記一方の基板の左右両側に形成された額縁領域に前記横行側の電極手段に接続された引き回し配線が形成され、前記他方の基板の左右両側の額縁領域に前記横行側の電極手段用引き回し副配線が形成され、前記一方の基板の引き回し配線とこれに対向する前記他方の基板の引き回し副配線とが前記上下導通部材により接続されるとともに、前記他方の基板の縦列側の電極手段が前記一方の基板上に形成された縦列側の接続配線を介して駆動回路手段に接続され、前記一方の基板の引き回し配線が前記一方の基板上に形成された横列側の接続配線を介して駆動回路手段に接続されてなることを特徴とする。電極手段に接続された引き回し配線と引き回し副配線が、相対向する基板に対向するように形成されていて、それらが上下導通部材で接続されているので、引き廻し配線単独で配線するよりも配線抵抗を低減できる。よって、駆動回路手段が画像表示領域のいずれの位置の電極手段に対して信号を印加しても、信号波形の鈍りを引き起こすことが少なく、明るさのムラを生じさせることなく表示ができる。

【0012】本発明は、前記画像表示領域の左右両側に等幅の額縁領域が形成されてなることを特徴とする。画像表示領域の左右両側に等幅の額縁領域が形成されていることで、画像表示領域を装置の中央部に配置できる。また、その上で先のように信号波形の鈍りを引き起こすことが少なく、明るさのムラを生じさせることなく表示ができる電気光学装置を提供できる。

【0013】本発明は、前記引き回し副配線が、該引き回し副配線を形成した基板上においては前記いずれの電極手段とも接続されていない孤立配線とされたものであることを特徴とする。引き廻し副配線は引き廻し配線と導通することで配線抵抗を低減するので、引き廻し副配線を形成した基板側の電極手段とは接続される必要は無い。

【0014】本発明は、前記上下導通手段が、絶縁樹脂層の内部に導電粒子を複数分散させたものからなることを特徴とする。上下導通部材として具体的には、絶縁樹脂層の内部に導電粒子を複数分散させたものを適用できるが、この構造のものであれば、液晶表示装置用上下導通材などとして広く一般に利用されているものを利用できる。上下導通部材を一对の基板で挟み込んで相互に押し付けて内部の導電粒子を引き廻し配線又は引き廻し副配線で挟み込むことで容易に上下導通が完了する。

【0015】本発明は、前記一对の基板間の周縁部に介在されたシール層により一对の基板間に液晶が封入されてなり、前記シール層を設けた領域の一部が前記引き回し配線と引き回し副配線が設けられた額縁領域とされるとともに、前記シール層の内部に複数の導電粒子が分散されてこれら導電粒子により引き回し配線と引き回し副

(5)

7

配線とが上下導通されてなることを特徴とする。シール層に導電粒子が分散されたものを用い、引き廻し配線を設ける額縁領域にもシール層を配置するならば、シール層が上下導通部材を兼ねる構成を採用できる。本発明は、前記シール層に、液晶層の厚みを制御するためのギャップ剤が散布されていることを特徴とする。シール層にギャップ剤が分散されていると、ギャップ剤を介して基板どうしが規定のセルギャップを構成するので、均一なセルギャップ、即ち均一な液晶層の厚さを確保できる。また、シール層にギャップ剤が分散されていると、画像表示領域側に分散させるギャップ剤を少なくする

か、あるいは画像表示領域側にギャップ剤を分散させなくとも均一なセルギャップ、即ち、均一な液晶層の厚さを確保できる。このような構造は特に表示領域にギャップ剤を分散させないタイプの液晶パネル、例えば携帯電話の液晶表示装置等の小型の液晶表示装置において有効である。

【0016】本発明は、前記額縁領域に形成された複数の引き廻し配線において、前記駆動回路手段と接続される電極手段のうち、前記駆動回路手段に位置的に遠い電極手段用の引き廻し配線幅が前記駆動回路手段に位置的に近い電極手段用の引き廻し配線幅よりも太くされてなることを特徴とする。駆動回路手段から遠い位置にある電極手段に接続された引き廻し配線の配線幅が、前記駆動回路手段に位置的に近い電極手段用の引き廻し配線幅よりも太くされてなるならば、位置的に遠い電極手段に対する引き廻し配線の配線抵抗を低くすることができ、画像表示領域に存在するいずれの位置の電極手段に対しても均等な明るさの表示ができる。

【0017】本発明は、前記信号電極手段が、各画素毎に形成された画素電極部と、前記信号配線部と前記画素電極部との間に配置された2端子型非線形素子を具備してなることを特徴とする。駆動回路手段が画像表示領域のいずれの位置の電極手段に対して信号を印加しても、明るさのムラを生じさせることなく表示ができる特徴を2端子型非線形素子を具備してなる構造の装置においても享受できる。

【0018】本発明の電子機器は、前記いずれかに記載の電気光学装置を表示手段として備えたことを特徴とするので、明るさのムラを生じさせることなく表示ができる特徴を有する。

【0019】

【発明の実施の形態】以下、本発明の実施の形態を図面に基づいて説明するが、本発明は以下の実施の形態に制約されるものではない。

「第1の実施の形態」図1～図4は、本発明をパッシブマトリクス型の液晶表示装置（電気光学装置）に適用した第1の実施の形態を示すもので、図1は液晶表示装置Aの全体構造を示す平面図、図2は前記液晶表示装置Aの一方の基板の平面図、図3は前記液晶表示装置Aの他

8

方の基板の平面図、図4は引き廻し配線と引き廻し副配線の接続部分の断面構造を示す。また、各図において、各層や各部材を図面上で認識可能な程度の大きさとするため、各層や各部材毎に縮尺を異ならしめてある。この形態の液晶表示装置Aは、一方の基板1と他方の基板2が対向配置されており、両基板間には液晶が封入されている。より具体的には基板1、2の周縁部側に、基板1、2間に位置して平面視略矩形状に配置されたシール層3が設けられていて、基板1、2とシール層3に囲まれて液晶が封入されている。また、前記シール層3の一部側（図1では上端部側）には液晶注入用の注入口3Aが基板1、2の端部に達するように形成され、この注入口3Aをシール材5で閉じることにより液晶が封入されている。

【0020】前記一方の基板1と他方の基板2の図1に示す状態での横幅（両基板1、2を対向配置させた平面視状態での横幅）は同一とされ、一方の基板1の縦幅（図1に示す縦幅）は他方の基板2よりも若干長く形成されていて、他方の基板2からはみ出して設けられた一方の基板1の端部側1Aの中央の設置領域4に1チップ型の駆動回路手段（駆動回路素子）6が設置されている。なお、図1に示すように基板1、2を対向配置した状態においてシール層3の内側には、後述する複数の電極（電極手段）13と複数の電極（電極手段）18がマトリクス状に配置されてこれらの電極により矩形状の画像表示領域GRが形成されている。次に、図1に示す画像表示領域GRの左側部分には左側の額縁領域8が形成され、画像表示領域GRの右側部分には右側の額縁領域9が形成され、画像表示領域GRの上側部分には上側の額縁領域10が形成され、画像表示領域GRの下側部分には下側の額縁領域11が形成され、それらのうち画像表示領域GRの左右両側の額縁領域8、9が等幅とされている。

【0021】次に基板1、2に形成された電極手段、引き廻し配線、引き廻し副配線等について詳細に説明する。なお、以下に説明する電極や配線は基本的にはITO（インジウム錫酸化物）などの透明導電材料から形成されているが、これらのうちの引き廻し配線や引き廻し副配線を低抵抗化のために金属配線で構成しても良いのは勿論である。図2に前記一方の基板1に形成されている電極手段の配置構造を示すが、この形態では基板1の中央側を占めるように縦列側（Y側）の帯状の8本の電極（電極手段）13が所定のピッチで形成されている。なお、図2では説明の簡略化のために8本の電極13のみを示したが、実際の液晶表示装置にあっては画面解像度に合わせて数十本～千数百本の電極が配置される。また、前記電極13が設置される領域は図1にも示すようにシール層3の内側の領域とされている。

【0022】次に、各電極13の一端部側（図1又は図2の下端部側）は基板1上に形成された接続配線15を

50

(6)

9

介して駆動回路素子6に接続されている。また、図2に示す基板1上の電極13の形成領域の右側には、図3を基に後述する他方の基板2側に形成される横行側の複数の電極18のうちの1本おきの電極18に個々に対応するように引き回し副配線16が形成され、電極13の形成領域の左側の基板1上にも、同様に後述する他方の基板2側に形成される電極18のうちの残りの1本おきの電極18に対応するように引き回し副配線17が形成され、各引き回し副配線16、17は個々に基板1上の駆動回路素子6に接続されている。なお、各引き回し副配線16は、図3を基に後述する電極18と同じ方向(X方向)に延出されて基板1上を横方向に伸びる配線部16aと、基板1上を縦方向(Y方向)に伸びて基板1の端部側まで延びる延出部16bと、基板1の端部から横方向(X方向)に延びて駆動回路素子6に接続するための接続部16cとから構成され、引き回し副配線17も同様に配線部17aと延出部17bと接続部17cとから構成されている。

【0023】図3に前記他方の基板2に形成された電極手段の配置構造を示すが、この形態では基板2の中央部側を占めるように横列側(X側)の帯状の10本の電極(電極手段)18が所定のピッチで形成されている。なお、図3では説明の簡略化のために10本の電極18のみを示したが、実際の液晶表示装置にあっては画面解像度に合わせて数十本~千数百本の電極が配置される。また、前記電極18が設置される領域は図1にも示すようにシール層3の内側の領域とされ、図1に示すように基板1、2を重ねて対向配置した状態において、前述の複数の電極13と複数の電極18とが先に説明したごとく平面視マトリクス状になるように配置されている。

【0024】次に、前記他方の基板2の右端部側には、前述の横行の複数の電極18の端部に交互に接続するように引き回し配線20が形成され、他方の基板2の左端側にも前述の横行の複数の電極18の残りのものの端部に交互に接続するように引き回し配線21が形成されている。前記引き回し配線20は電極18の右側の端部に接続されて基板2の横方向(X方向)に延びる接続部20aと、基板2の縦方向(Y方向)に基板2の端部まで延びる延出部20bとから構成され、引き回し配線21も同様に電極18の左側の端部に接続されて基板2の横方向に延びる接続部21aと基板2の縦方向に基板2の端部まで延びる延出部21bとから構成されている。そして、これらの引き回し配線20は先に説明した基板1上の引き回し副配線16と対応するように形成され、先の引き回し配線21が先に説明した基板1上の引き回し副配線17と対応するように形成されている。即ち、図1に示すように基板1、2を対向配置した状態で個々の引き回し副配線16と個々の引き回し配線20とが平面視ほぼ重なるように、個々の引き回し副配線17と個々の引き回し配線21とが平面視ほぼ重なるように配置され

10

ている。

【0025】次に、前記基板1、2を図1に示すように対向配置した状態においては、各引き回し配線20の接続部20aと、各引き回し副配線16の配線部16aの部分にシール層3の一部が位置されるとともに、各引き回し配線21の接続部21aと各引き回し副配線17の配線部17aの部分にシール層3の一部が位置されている。また、画像表示領域GRの左側の額縁領域8に主に先の引き回し副配線17の延出部17bと引き回し配線21の延出部21bが配置され、画像表示領域GRの右側の額縁領域9に主に先の引き回し副配線16の延出部16bと引き回し配線20の延出部20bが配置されている。

【0026】そして、これら基板1、2間の額縁領域8に対応する部分と額縁領域9に対応する部分において、シール層3の外側領域(図1で各外側領域に斜線を付した部分)に上下導通部材25が介在されている。これらの上下導通部材25は、絶縁性の絶縁樹脂層26の内部に導電粒子27が複数分散されてなるものである。この導電粒子27とは、粒径数 $\mu\text{m}$ のメタルボール、球形の導電性ポリマーボール、球形のポリマーボールの表面にメタルコーティングを施したもの等、いずれのものを用いても良い。具体的には基板1、2を対向させて張り合わせて一体化する場合に、両者の額縁領域8、9に介在させておいた状態から基板1、2を圧着すると、基板1、2に形成された延出部16b、20bあるいは延出部17b、21bが導電粒子27を図3に示すように挟み込むことで電氣的に上下導通がなされるようになっていく。なお、これらと同じように、額縁領域8、9に存在する引き回し副配線16、17の配線部16a、17aと引き回し配線20、21の延出部20a、21aにおいても上下導通部材25により電氣的な接続がなされている。従って、基板1、2を平面視した場合に相対向する引き回し配線20と引き回し副配線16が個々に電氣的に上下導通され、相対向する引き回し配線21と引き回し副配線17とが個々に電氣的に上下導通されている。

【0027】なお、実際の液晶表示装置の場合、前記基板1、2の外側には偏光板や位相差板等が配置されるが、本実施形態の説明ではこれらの部材の記載と説明を省略するとともに、液晶表示装置が透過型の場合は基板裏面側にバックライトが設けられ、反射型の場合は反射層が設けられ、カラー表示型の場合はカラーフィルタが設けられるが、これらの構成要素の説明は本実施の形態の場合は省略した。

【0028】以上の如く構成された液晶表示装置Aでは、駆動回路素子6が各電極13、18に画像信号及び走査信号を各々所定のタイミングで供給することにより、これらの電極13…、18…を駆動することで、これらの電極の交差部分間に存在する液晶分子の配向状態



(7)

11

を制御して表示を制御することができる。そして、駆動回路素子6が横行の電極18…を駆動するために各電極18に電圧を印加しようとした場合において、駆動回路素子6に近い位置にある電極18と駆動回路素子6から離れた位置にある電極18と同じ電圧を印加しようとしても、駆動回路素子6と電極18との間には、額縁領域8に存在する上下導通部材25により上下導通された引き回し配線20と引き回し副配線16、及び額縁領域9に存在する上下導通部材25により上下導通された引き回し配線21と引き回し副配線17が存在するので、これらを含めた引き回し配線全体としての抵抗を、図11に示す構造よりも低抵抗化できている結果として、いずれの位置の電極18にも目的とする電圧を確実に印加して駆動することができる。よって、駆動回路素子6から離れた電極18に対応する画像表示領域GRの一部においても、駆動回路素子6に近い位置にある電極18に対応する画像表示領域GRの一部においても均一の明るさの表示を得ることができる。次いで本実施の形態の装置では、画像表示領域GRの左右両側にはほぼ等幅の額縁領域8、9が形成されているので、額縁表示領域GRを液晶表示装置全体の中央部に配置することができる。

【0029】なお、本実施の形態においては、引き回し配線20、21と引き回し副配線16、17の個々の幅については特に問わないが、これらを均等幅としても良く、異なる幅としても良い。異なる幅とする場合は、駆動回路素子6に一番近い電極18に接続する引き回し配線20、21を一番細く形成し、駆動回路素子6から離れた電極18になるにつれて徐々に引き回し配線20、21を太く形成してゆき、駆動回路素子6から最も離れた引き回し配線20、21を一番太く形成するなどの構造を採用しても良い。また、引き回し配線20、21と引き回し副配線16、17を金属配線とすることもできる。金属配線とした場合、ITOなどの透明導電材料よりも低抵抗化できるので、配線の幅そのものを細線化することができ、更なる狭額縁化を図ることができる。また、本実施の形態では、引き回し配線20、21を1つおきの電極18に接続したが、これらの接続のし方に制限があるものではなく、複数本おきに接続しても良い。

【0030】「第2の実施の形態」図5は、本発明をパッシブマトリクス型の液晶表示装置（電気光学装置）に適用した第2の実施の形態を示すもので、図5（a）は本形態の液晶表示装置の平面略図、図5（b）は液晶表示装置の一方の基板の電極と引き回し配線等を示す平面略図、図5（c）は液晶表示装置の他方の基板の電極と引き回し配線等を示す平面略図である。また、各図において、各層や各部材を図面上で認識可能な程度の大きさとするため、各層や各部材毎に縮尺を異ならしめてある。この第2の実施の形態の液晶表示装置Bは、先の第1の実施の形態の液晶表示装置Aの配線構造を一方の基

12

板側と他方の基板側とで逆にした形態の液晶表示装置の一例であるので、同一の構成部分には同一符号を付して、それらの説明を簡略化する。更に、第2の実施の形態において、一方の基板31と他方の基板32とが対向配置されてそれらの間に液晶が挟持され、基板間にシール層が設けられる構造については第1の実施の形態と同等であるので、図5（a）では電極と配線構造の要部のみを示し、図5（b）では一方の基板31の電極と引き回し配線の配置構造のみを説明し、図5（c）では他方の基板32の電極と引き回し配線の配置構造のみを説明し、シール層などの部分についての詳細構造の記載と説明を省略する。

【0031】図5（b）に示すように、一方の基板31には横行の電極33が複数所定のピッチで形成され、図5（c）に示すように他方の基板32には縦列の電極35が複数所定のピッチで形成され、一方の基板31と他方の基板32を図5（a）に示すように対向させた状態において、複数の電極33と複数の電極35が平面視マトリクス状に配置されて画像表示領域GRを構成するように構成されている。前記一方の基板31の画像表示領域GRの右側の額縁領域38にはそれぞれ電極用の引き回し配線40が1つおきの電極33の右端部に接続されて設けられ、画像表示領域GRの左側の額縁領域39にはそれぞれ引き回し配線41が残りの1つおきの電極33の左端部に接続されて設けられている。先の各引き回し配線40は先の第1の実施の形態の引き回し配線の場合と同様に、電極33に沿って横方向に延びて電極33の端部に接続する接続部40aと、基板32の縦方向に延びる延出部40bと、基板32の横方向に延びて駆動回路素子6に接続する接続部40cとからなり、引き回し配線41も接続部41aと延出部41bと接続部41cとからなる。

【0032】次に、図5（b）に示す他方の基板32の電極35の右側の額縁領域38に先の引き回し配線40の接続部40aと同等の形状の配線部43aと先の延出部40bと同じ方向に延びる延出部43bからなる引き回し副配線43が形成され、基板32の左側の額縁領域39にも先の引き回し配線41の接続部41aと同等の形状の配線部44aと先の延出部41bと同じ方向に延びる延出部44bからなる引き回し副配線44が形成されている。従って、図5（a）に示すように基板31、32を対向配置させた状態において引き回し配線40と引き回し副配線43とが平面視重なり、引き回し配線41と引き回し副配線44が平面視重なるように形成されている。そして、先の第1の実施の形態の場合と同様に、これらの基板31、32の両側の額縁領域38、39の間に配置される上下導通部材25により引き回し配線40と引き回し副配線43とが導通され、引き回し配線41と引き回し副配線44とが上下導通部材25により導通されている。また、他方の基板32の縦列の電極



(8)

13

35の下端部側に各電極35に接続されるとともに基板31の端部側に延出された複数の接続配線45が形成され、これらの接続配線45は先の第1の基板31の駆動回路素子6に接続された接続配線47に上下導通部材48を介して接続されている。

【0033】図5(a)に示す構造の基板31、32を有する液晶表示装置Bにおいても先の第1の実施の形態の液晶表示装置Aと同等の作用効果を得ることができる。即ち、以上の如く構成される液晶表示装置においては、駆動回路素子6が各電極33、35に画像信号及び走査信号を各々所定のタイミングで供給することにより、これらの電極を駆動することで、これらの電極間に存在する液晶の配向を制御して表示を制御することができる。そして、駆動回路素子6が横行の電極33...を駆動するために各電極33に電圧を印加しようとした場合において、駆動回路素子6に近い位置にある電極33と駆動回路素子6から離れた位置にある電極33との間に電圧を印加しても、駆動回路素子6と電極33との間には、額縁領域38に存在する上下導通部材25により上下導通された引き回し配線40と引き回し副配線43、あるいは、額縁領域39に存在する上下導通部材25により上下導通された引き回し配線41と引き回し副配線44が存在するので、これらの配線抵抗を図11に示す構造よりも低抵抗化できている結果として、いずれの位置の電極33にも目的とする電圧を確実に印加して駆動することができる。よって、駆動回路素子6から離れた電極33が位置する画像表示領域GRの一部側においても均一の明るさを得ることができる。次いで、画像表示領域の左右両側にはほぼ等幅の額縁領域38、39が形成されているので、額縁表示領域GRを液晶表示装置全体の中央部に配置することができるという点については先の第1の実施の形態と同様の効果を得ることができる。

【0034】「第3の実施の形態」図6は、本発明をパッシブマトリクス型の液晶表示装置（電気光学装置）に適用した第3の実施の形態を示す平面図である。また、図6において、各層や各部材を図面上で認識可能な程度の大きさとするため、各層や各部材毎に縮尺を異ならしめてある。この第3の実施の形態の液晶表示装置Cは、先の第1の実施の形態の液晶表示装置Aの配線構造と略同一であるが、シール層の形成位置を額縁領域まで広く拡張して設け、シール層に上下導通機能を付与した構造の一形態である。なお、第3の実施の形態において、一方の基板1と他方の基板2とが対向配置されてそれらの間に液晶が挟持され、基板間にシール層が設けられる構造については第1の実施の形態と同等であるので、それらの部分の説明を省略する。

【0035】この第3の実施の形態においては、シール層53の内部に導電粒子が分散されてなり、シール層53が上下導通部材を兼ねた構造とされている。即ち、基

14

板1、2の左右の額縁領域8、9に延出するような延出部53A、53Bを有するようにシール層53が拡張形成されている。その他の部分の構造については先の第1の実施の形態の液晶表示装置Aと同等であるので、同一の部分には同一の符号を付して、それら同一部分の説明を省略する。

【0036】図6に示す構造の基板1、2とシール層53とを有する液晶表示装置Cにおいても先の第1の実施の形態の液晶表示装置Aと同等の作用効果を得ることができる。即ち、以上の如く構成される液晶表示装置Cにおいては、駆動回路素子6が各電極13、18に画像信号及び走査信号を各々所定のタイミングで供給することにより、これらの電極を駆動することで、これらの電極間に存在する液晶の配向を制御して表示を制御することができる。そして、駆動回路素子6が横行の電極18...を駆動するために各電極18に電圧を印加しようとした場合において、駆動回路素子6に近い位置にある電極18と駆動回路素子6から離れた位置にある電極18と同じ電圧を印加しても、駆動回路素子6と電極18との間には、額縁領域8に存在するシール層53Aにより上下導通された引き回し配線20と引き回し副配線16、あるいは、額縁領域9に存在するシール層53Bにより上下導通された引き回し配線21と引き回し副配線17が存在するので、これらの配線抵抗を図11に示す構造よりも低抵抗化できている結果として、いずれの位置の電極18にも目的とする電圧を確実に印加して駆動することができる。よって、駆動回路素子6から離れた位置の電極18における画像表示領域GRの一部においても駆動回路素子6に近い電極18に対応する画像表示領域GRの一部においても同じ明るさの表示を得ることができる。次いで、画像表示領域の左右両側にはほぼ等幅の額縁領域8、9が形成されているので、画像表示領域GRを液晶表示装置全体の中央部に配置することができる。この場合、図6のシール層53を形成すると同時に、引き回し配線20、21と引き回し副配線16、17の上下導通が形成され、製造工程の簡略化がはかれるため、装置全体の製造コストを下げる効果がある。また、液晶表示装置では、液晶層の厚みを均一に制御するためにギャップ剤と呼ばれるシリカ（ $\text{SiO}_2$ ）等のボールをばらまき、基板1、2に圧力をかけて規定のセルギャップを制定して製造するが、このシリカ等のボールには光を制御することができない。このため、均一なギャップ（液晶層の厚み）を得ようとする場合には、ギャップ剤を多くばらまく必要があるが、多くばらまくほど、表示品位を落とす。シール層53に、このギャップ剤を導電粒子27とともに混ぜておくことによって、画像表示領域GRのギャップ剤を減らすことが出来る。このことによって、画像表示領域GRの光制御領域が大きくなり高品位な表示をすることができる。携帯電話などに適用される液晶表示装置では、画像表示領域GRが小

(9)

15

さく、この領域にはギャップ剤をまかずに、シール層のみのギャップ剤で十分な液晶層の厚み精度を確保できる。この場合には、ギャップ剤を散布する製造工程も省略され、さらに低コストにすることができる。

【0037】図7は本発明に係る液晶表示装置（電気光学装置）の第4の実施の形態を示すもので、この形態において、引き回し配線を画像表示領域GRの左右両側に均等に設けるのではなく、一侧のみ（図面では左側のみ）に設けた構造を示すものである。この第4の実施の形態の液晶表示装置（電気光学装置）Dは、先の第1の実施の形態ではシール層3の右側に設けられていた額縁領域8が略され、代りに、シール層3の左側の額縁領域58が先の第1の実施の形態よりも幅広に形成されている。そして、横行の電極18に接続されるべき引き回し配線21は1つおきの電極18ではなく全ての電極18に個々に接続される形で設けられ、同様に引き回し副配線17についても全ての引き回し配線21に対応する形で形成されている。その代わり、画像表示領域GRの右側の額縁領域には引き回し配線と引き回し副配線が形成されていない。その他の構造については先の第1の実施の形態の構造と同等である。

【0038】図7に示す構造の額縁領域58と引き回し配線17と引き回し副配線21を有する液晶表示装置Dにおいては、画像表示領域GRを装置中央部には配置できないが、それを除いて、先の第1の実施の形態の液晶表示装置Aと同等の作用効果を得ることができる。即ち、駆動回路素子6が横行の電極18...を駆動するために各電極18に電圧を印加しようとした場合において、駆動回路素子6に近い位置にある電極18と駆動回路素子6から離れた位置にある電極18とに電圧を印加しても、駆動回路素子6と電極18との間には、額縁領域58に存在する上下導通部材25により上下導通された引き回し配線21と引き回し副配線17が存在するので、配線抵抗を図11に示す構造よりも低抵抗化できている結果として、いずれの位置の電極18にも目的とする電圧を確実に印加して駆動することができる。よって、駆動回路素子6から離れた画像表示領域GRにおいても、駆動回路素子6に近い画像表示領域GRにおいても均一の明るさを得ることができる。

【0039】ところでこれまでの実施の形態においては、パッシブマトリクス型の液晶表示装置に本発明を適用した例について説明したが、本発明を2端子型の線形素子をスイッチ素子とするアクティブマトリクス型の液晶表示装置（電気光学装置）に適用しても良いのは勿論である。図8はこの種の2端子型の線形素子をスイッチ素子とするアクティブマトリクス型の液晶表示装置の画像表示領域の配線回路の要部を示すもので、この形態において、対向側の基板61に対して素子側の基板62が規定のセルギャップを介して対向配置され、両基板61、62間に図示略の液晶が封入され、対向側の基板61に複

16

数の帯状の走査電極（電極手段）64が所定のピッチで形成された構成とされている。

【0040】また、素子側の基板62には、絶縁膜71、所定のピッチで形成された複数の信号線72、複数の薄膜ダイオード73等が形成され、これらのうち、前記信号線72は所定のピッチで先の走査電極64と直交するように配置され、隣接する走査電極64の間に複数の画素電極（電極手段）74が配列され、先の複数の走査電極64と複数の信号線72とが平面視交差する領域が画像表示領域とされている。更に、先の薄膜ダイオード73は、走査線72から画素電極74側に延設された片状の素子部74aを備え、素子部74a上には絶縁膜が形成されている。そして、当該素子部74aを覆うように、かつ、画素電極74と一部重なるようにして導電膜75が形成されている。なお、対向側の基板61側には液晶表示装置がカラー表示対応型の場合はカラーフィルタ、ブラックマトリクス等が形成されるが、図8ではこれらの部分を省略している。

【0041】以上のように構成された液晶表示装置においても走査電極（電極手段）64が所定のピッチで複数形成され、各走査電極64が基板上に設けられる駆動回路素子に接続されるので、走査電極64の端部に接続する引き回し配線に対して先の第1の実施の形態の場合と同様に本発明構造を適用することができる。即ち、図1に示す複数の電極18を本実施の形態では走査電極64と見立て、基板61の額縁領域に引き回し配線を設け、基板62の額縁領域に引き回し副配線を設け、引き回し配線と引き回し副配線とを両基板61、62の額縁領域間に設けられる上下導通部材で接続するならば、引き回し配線の低抵抗化をなすことができ、先の第1の実施形態の場合と同様に駆動回路素子から離れた位置での電極と駆動回路素子に近い位置での電極に同じ実効電圧を印加することができる。

【0042】（電子機器の実施形態）次に、前記の第1～第5の実施形態の液晶表示装置（電気光学装置）のいずれかを備えた電子機器の具体例について説明する。図9（a）は、携帯電話の一例を示した斜視図である。図9（a）において、符号500は携帯電話本体を示し、符号501は前記の液晶表示装置のいずれかをを用いた液晶表示部を示している。図9（b）は、ワープロ、パソコンなどの携帯型情報処理装置の一例を示した斜視図である。図9（b）において、符号600は情報処理装置、符号601はキーボードなどの入力部、符号603は情報処理装置本体、符号602は前記の液晶表示装置のいずれかをを用いた液晶表示部を示している。図9

（c）は、腕時計型電子機器の一例を示した斜視図である。図9（c）において、符号700は時計本体を示し、符号701は前記の液晶表示装置のいずれかをを用いた液晶表示部を示している。図9（a）～（c）に示すそれぞれの電子機器は、前記の液晶表示装置のいずれか

(10)

17

を用いた液晶表示部を備えたものであるので、明るさの均一な表示形態を有し、額縁領域が画像表示領域の左右に均等で狭く、しかも表示品質の高いものとなる。

【0043】

【発明の効果】以上説明したように本発明によれば、画像表示領域の外側の額縁領域に、引き回し配線と引き回し副配線が、相対向する基板に対向するように形成され、それらが上下導通部材で接続されているので、引き回し配線単独で配線するよりも配線抵抗を低減できる。よって本発明構造により、駆動回路手段が画像表示領域のいずれの位置の走査電極手段あるいは信号電極手段に対して信号を印加しても、信号波形の鈍りを引き起こすことが少なく、明るさのムラを生じさせることなく表示ができる特徴を有する。

【0044】本発明によれば、前記画像表示領域の左右両側に等幅の額縁領域が形成されていることで、画像表示領域を装置の中央部に配置できる。また、その上で先のように信号波形の鈍りを引き起こすことが少なく、明るさのムラを生じさせることなく表示ができる電気光学装置を提供できる。

【0045】本発明によれば、上下導通部材として具体的には、絶縁樹脂層の内部に導電粒子を複数分散させたものを適用できるが、この構造のものであれば、液晶表示装置用上下導通材などとして広く一般に利用されているものを利用できる。上下導通部材を一对の基板で挟み込んで相互に押し付けて内部の導電粒子を引き回し配線又は引き回し副配線で挟み込むことで容易に上下導通が完了する。

【0046】本発明において、シール層を設けた領域の一部を引き回し配線と引き回し副配線を設ける額縁領域とするとともに、前記シール層の内部に複数の導電粒子を分散してこれら導電粒子により引き回し配線と引き回し副配線とを上下導通することができ、シール層によって上下導通部材を兼ねる構成を採用できる。

【0047】本発明において、駆動回路手段に位置的に遠い電極手段用の引き回し配線の幅を駆動回路手段に位置的に近い電極手段用の引き回し配線の幅よりも太くするならば、駆動回路手段に対して位置的に遠い電極手段に対する引き回し配線の配線抵抗を低くすることができ、画像表示領域に存在するいずれの位置の電極手段に対しても均等な明るさの表示ができる。

【0048】本発明は、前記信号電極手段が、各画素毎に形成された画素電極部と、前記信号配線部と前記画素電極部との間に配置された2端子型非線形素子を具備してなる構成にも適用することができ、駆動回路手段が画像表示領域のいずれの位置の電極手段に対して信号を印加しても、明るさのムラを生じさせることなく表示ができる装置を提供できる。

18

【0049】本発明の電子機器は、前記いずれかに記載の電気光学装置を表示手段として備えたことを特徴とするので、明るさのムラのない表示ができる特徴を有する。

【図面の簡単な説明】

【図1】 図1は本発明に係る第1の実施の形態の液晶表示装置の概略構造を示す平面図である。

【図2】 図2は同液晶表示装置の一方の基板を示す平面図である。

【図3】 図3は同液晶表示装置の他方の基板を示す透視図である。

【図4】 図4は同液晶表示装置の引き回し配線と引き回し副配線の接続部分の断面図である。

【図5】 図5は本発明に係る第2の実施の形態の液晶表示装置を説明するためのもので、図5(a)は液晶表示装置の概略平面図、図5(b)は一方の基板の電極と引き回し配線を示す平面略図、図5(c)は他方の基板の電極と引き回し配線を示す透視図である。

【図6】 図6は本発明に係る第3の実施の形態の液晶表示装置の概略構造を示す平面図である。

【図7】 図7は本発明に係る第4の実施の形態の液晶表示装置の概略構造を示す平面図である。

【図8】 図8は本発明に係る第5の実施の形態の液晶表示装置の基板の画像表示領域の概略構造を示す部分断面図である。

【図9】 図9は本発明に係る電気光学装置を備えた電子機器の適用例を示すもので、図9(a)は携帯電話の斜視図、図9(b)は携帯型情報端末の斜視図、図9(c)は腕時計型電子機器の斜視図である。

【図10】 図10は従来の液晶表示装置の一例を示すもので、図10(a)はマトリクス状に配置された電極の配置構造を示す平面図、図10(b)は断面図である。

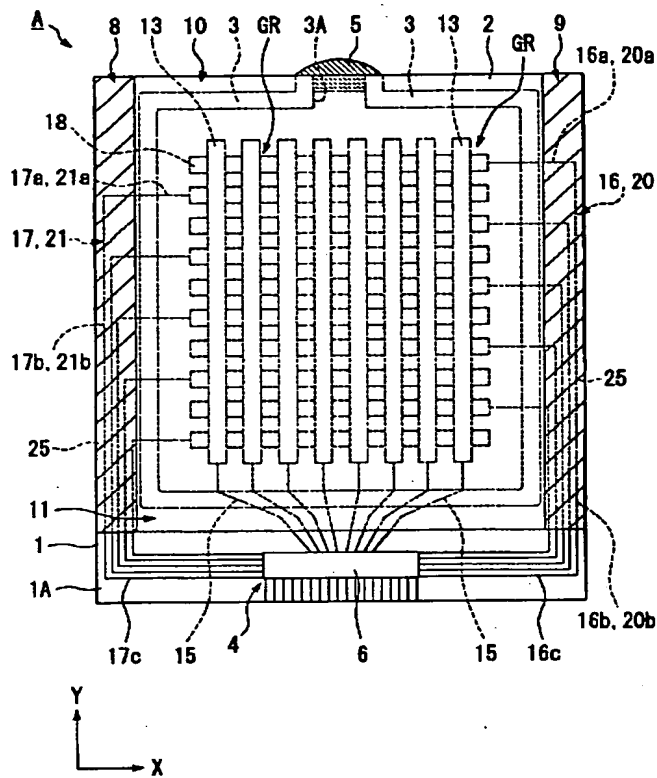
【図11】 図11は本発明者らが提案している液晶表示装置の一例を示す平面図である。

【符号の説明】

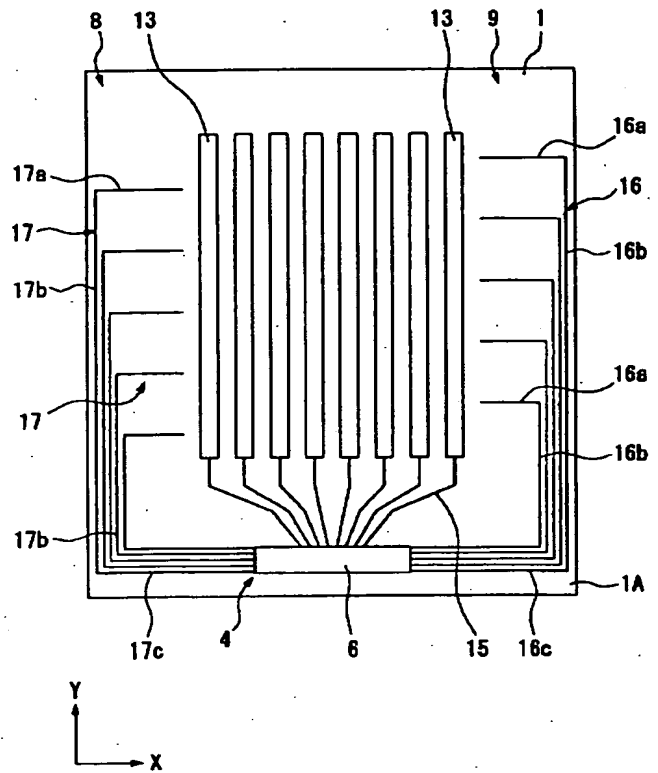
GR	画像表示領域
1、2	基板
3	シール層
6	駆動回路素子（駆動回路手段）
8、9	額縁領域
13、18	電極（電極手段）
16、17	引き回し副配線
20、21	引き回し配線
25	上下導通部材
26	絶縁樹脂層
27	導電粒子

(11)

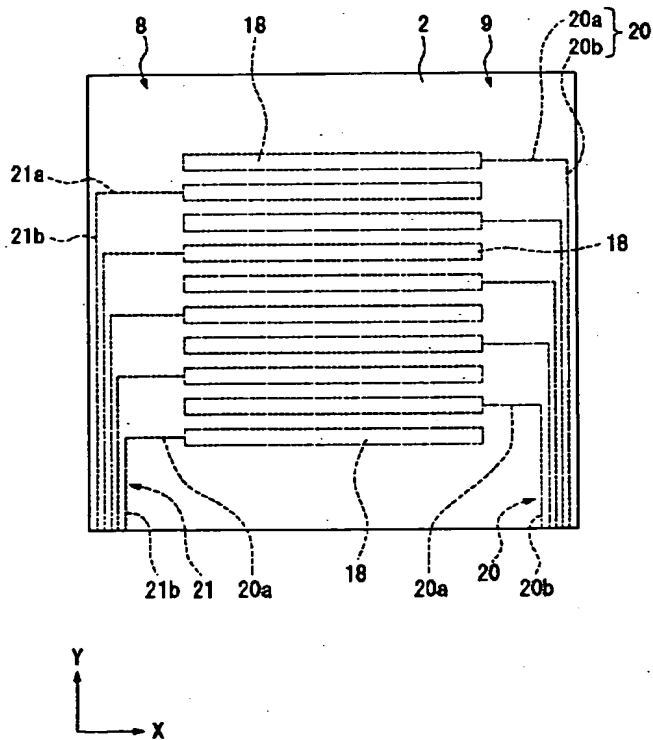
【図1】



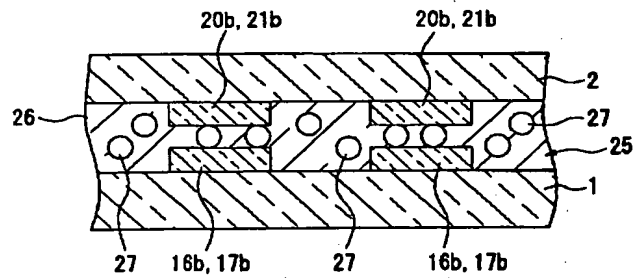
【図2】



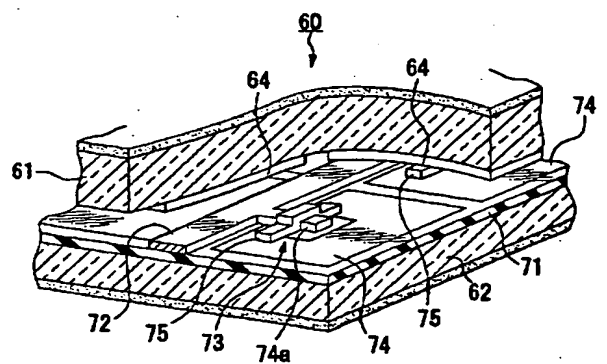
【図3】



【図4】

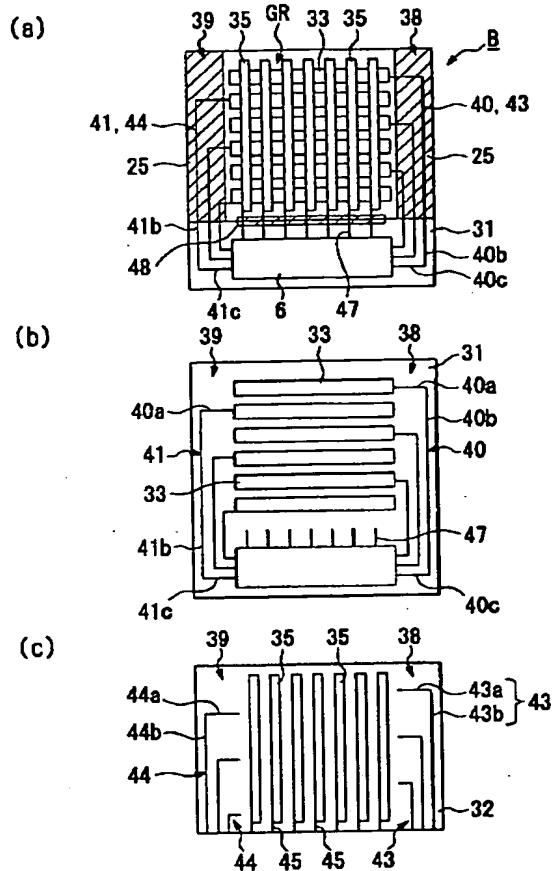


【図8】

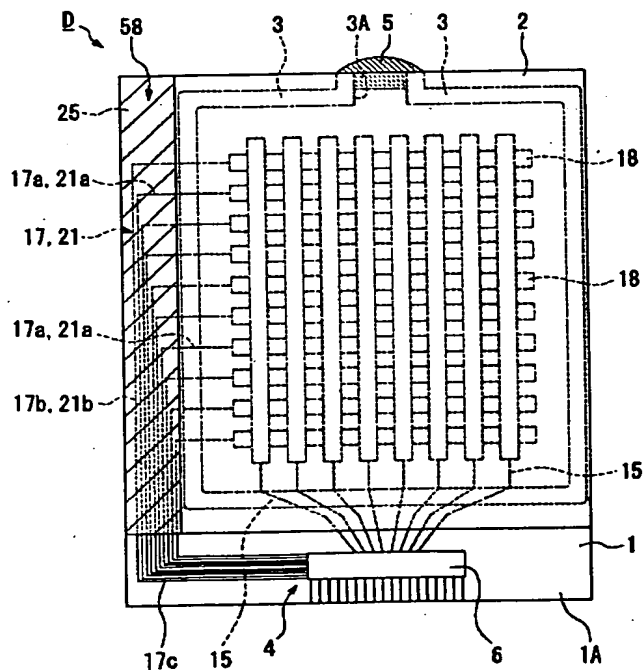


(12)

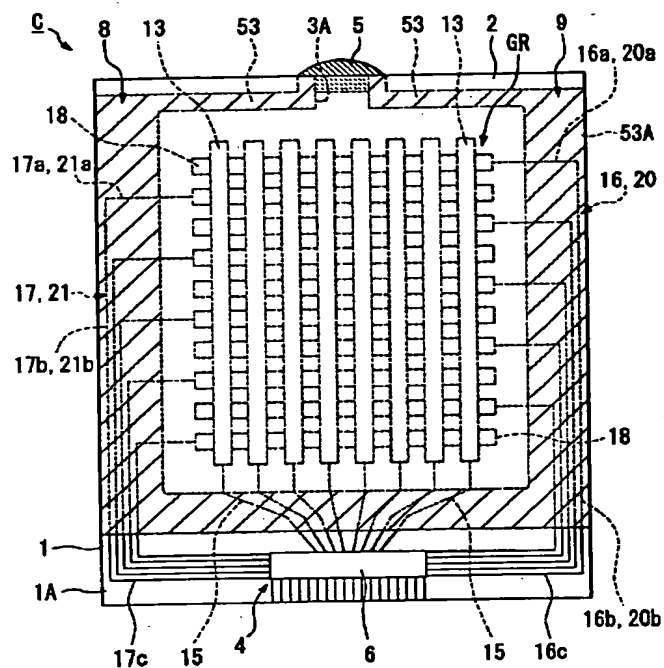
【図5】



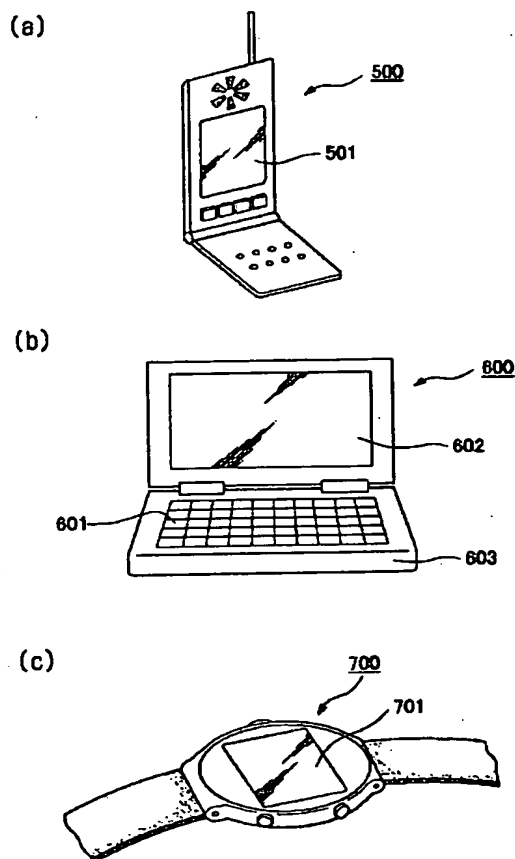
【図7】



【図6】

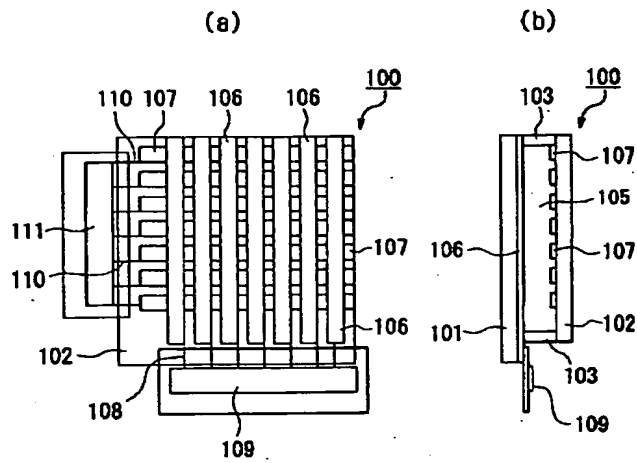


【図9】

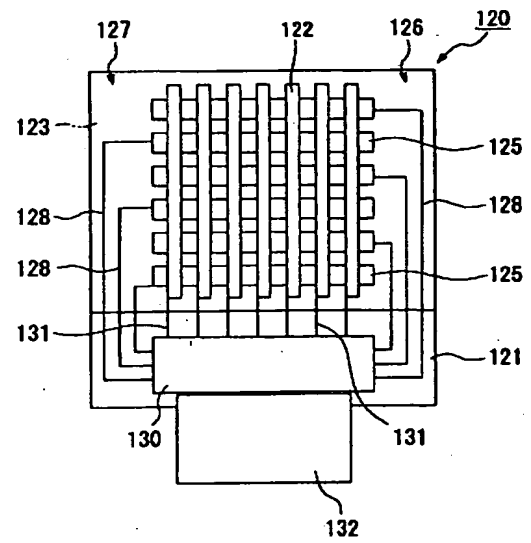


(13)

【図10】



【図11】



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